ESIE05-01

# *Service Manual*

**RR/RQ71~125B7**
**Sky-Air R410A non-inverter B-series**

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# 1 Introduction

## 1.1 About This Manual

**Target group**

This service manual is intended for and should only be used by qualified engineers.

**Purpose of this manual**

This service manual contains all the information you need to do the necessary repair and maintenance tasks for the Sky Air R410A B-series room air conditioners.

**Five parts**

This service manual consists of an introduction, five parts and an index:

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**Introduction overview**

The introduction contains the following topics:

| Topic | See page |
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**Note:**

This Service Manual is about Outdoor Models only. Please refer to the indoor unit Service Manual ESIE05-04 for details on the indoor units.

## 1.2 Combination Overview: Outdoor Units of the Sky Air B-Series

**Introduction**

In the tables in this section:

- ➤ “P” stands for pair combination.
- ➤ “T” stands for twin or triple combination.

**Combination matrix**

Cooling only units:

| MODEL NAME | FCQ35 | FCQ50 | FCQ60 | FCQ71 | FCQ100 | FCQ125 | FBQ35 | FBQ50 | FBQ60 | FBQ71 | FBQ100 | FBQ125 | FHQ35 | FHQ50 | FHQ60 | FHQ71 | FHQ100 | FHQ125 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RR71B | **T** | — | — | **P** | — | — | **T** | — | — | **P** | — | — | **T** | — | — | **P** | — | — |
| RR100B | **T** | **T** | **T** | **T** | **P** | — | **T** | **T** | **T** | **T** | **P** | — | **T** | **T** | **T** | **T** | **P** | — |
| RR125B | — | **T** | **T** | **T** | — | **P** | — | **T** | **T** | **T** | — | **P** | — | **T** | **T** | **T** | — | **P** |

| MODEL NAME | FUQ71 | FUQ100 | FUQ125 | FAQ71 | FAQ100 | FFQ35 | FFQ50 | FFQ60 | FDQ125 |
|---|---|---|---|---|---|---|---|---|---|
| RR71B | **P** | — | — | **P** | — | **T** | — | — | — |
| RR100B | **T** | **P** | — | **T** | **P** | **T** | **T** | **T** | — |
| RR125B | **T** | — | **P** | **T** | — | — | **T** | **T** | **P** |

Heat pump units:

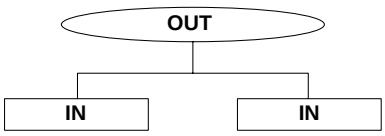
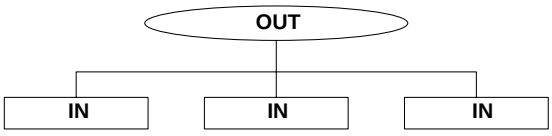
| MODEL NAME | FCQ35 | FCQ50 | FCQ60 | FCQ71 | FCQ100 | FCQ125 | FBQ35 | FBQ50 | FBQ60 | FBQ71 | FBQ100 | FBQ125 | FHQ35 | FHQ50 | FHQ60 | FHQ71 | FHQ100 | FHQ125 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RQ71B | **T** | — | — | **P** | — | — | **T** | — | — | **P** | — | — | **T** | — | — | **P** | — | — |
| RQ100B | **T** | **T** | **T** | **T** | **P** | — | **T** | **T** | **T** | **T** | **P** | — | **T** | **T** | **T** | **T** | **P** | — |
| RQ125B | — | **T** | **T** | **T** | — | **P** | — | **T** | **T** | **T** | — | **P** | — | **T** | **T** | **T** | — | **P** |

| MODEL NAME | FUQ71 | FUQ100 | FUQ125 | FAQ71 | FAQ100 | FFQ35 | FFQ50 | FFQ60 | FDQ125 |
|---|---|---|---|---|---|---|---|---|---|
| RQ71B | **P** | — | — | **P** | — | **T** | — | — | — |
| RQ100B | **T** | **P** | — | **T** | **P** | **T** | **T** | **T** | — |
| RQ125B | **T** | — | **P** | **T** | — | — | **T** | **T** | **P** |

**Allowed capacity combinations for twin & triple**

| | Outdoor unit | | |
|---|---|---|---|
| | **71** | **100** | **125** |
| **Indoor units** | 35 + 35 | 35 + 71<br>50 + 60<br>50 + 50<br>35 + 35 + 35 | 60 + 60<br>50 + 71<br>50 + 50 + 50 |

**Required refnets**

| | **Possible indoor combination** | | | | | |
|---|---|---|---|---|---|---|
| | **Simultaneous operation** | | | | | |
| **Outdoor models** | TWIN | | | TRIPLE | | |
| |  | | |  | | |
| RQ71B7V3/W1<br>RR71B7V3/W1 | 35-35<br>(KHRQ22M20TA7) | | | | | |
| RQ100B7V3/W1<br>RR7100B7V3/W1 | 50-50<br>(KHRQ22M20TA7) | 50-60<br>(KHRQ22M20TA7) | 35-71<br>(KHRQ22M20TA7) | 35-35-35<br>(KHRQ127H7) | | |
| RQ125B7V3/W1<br>RR125B7V3/W1 | 60-60<br>(KHRQ22M20TA7) | 50-71<br>(KHRQ22M20TA7) | | 50-50-50<br>(KHRQ127H7) | | |

**Note:**

In case of twin/triple application, designate the remote controller that is equipped with the most functions as the “master” (main) unit. In below table, units are listed in order of available functions (most functions are on FCQ, less functions are on FBQ):

- FCQ35~71
- FFQ35~60
- FUQ71
- FHQ35~71
- FAQ71
- FBQ35~71

## 1.3 Precautions on handling new refrigerants

### 1.3.1 Outline

**About Refrigerant R410A**

➤ Characteristics of new refrigerant, R410A

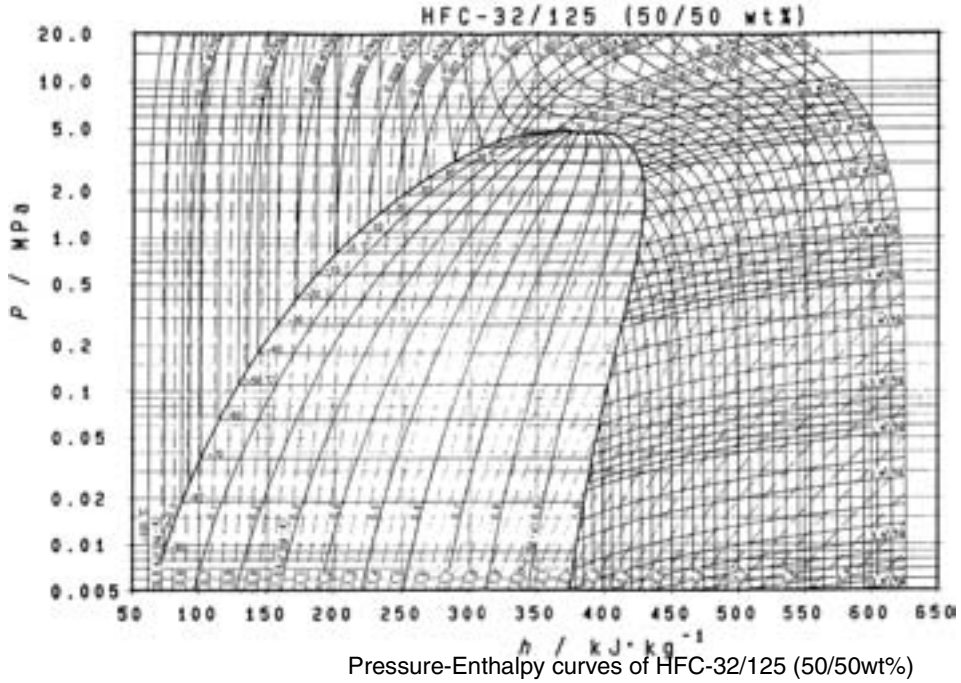
**1** Performance
Almost the same performance as R22 and R407C.

**2** Pressure
Working pressure is approx. 1.4 times more than R22 and R407C.

**3** Refrigerant composition
Few problems in composition control, since it is a Quasi-azeotropic mixture refrigerant.

| | HFC units (Units using new refrigerants) | | HCFC units |
|---|---|---|---|
| **Refrigerant name** | **R407C** | **R410A** | **R22** |
| Composing substances | Non-azeotropic mixture of HFC32, HFC125 and HFC134a (*1) | Quasi-azeotropic mixture of HFC32 and JFC125 (*1) | Single-component refrigerant |
| Design pressure | 3.2 Mpa (gauge pressure) = 32.6 kgf/cm$^2$ | 4.15 Mpa (gauge pressure) = 42.3 kgf/cm$^2$ | 2.75Mpa (gauge pressure) = 28.0 kgf/cm$^2$ |
| Refrigerant oil | Synthetic oil (Ether) | | Mineral oil (Suniso) |
| Ozone destruction factor (ODP) | 0 | 0 | 0.05 |
| Combustibility | None | None | None |
| Toxicity | None | None | None |

*1. Non-azeotropic mixture refrigerant: mixture of two or more refrigerants having different boiling points.
*2. Quasi-azeotropic mixture refrigerant: mixture of two or more refrigerants having similar boiling points.
*3. The design pressure is different at each product. Please refer to the installation manual for each product.
(Reference) 1 Mpa ≒ 1 0.19716 kgf / cm$^2$



Pressure-Enthalpy curves of HFC-32/125 (50/50wt%)

➤ Thermodynamic characteristic of R410A

DAIREP ver2.0

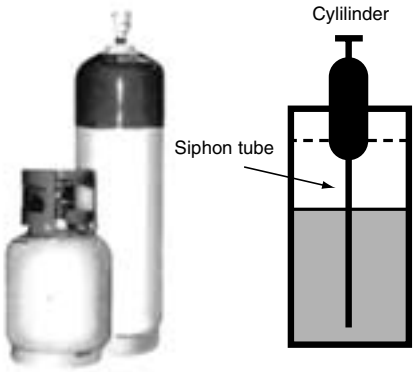
| Temperature (℃) | Steam pressure (kPa) | | Density (kg/m³) | | Specific heat at constant pressure (kJ/kgK) | | Specific enthalpy (kJ/kg) | | Specific entropy (kJ/KgK) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Liquid | Vapor | Liquid | Vapor | Liquid | Vapor | Liquid | Vapor | Liquid | Vapor |
| 70 | 36.13 | 36.11 | 1410.7 | 1.582 | 1.372 | 0.695 | 100.8 | 390.6 | 0.649 | 2.074 |
| -68 | 40.83 | 40.80 | 1404.7 | 1.774 | 1.374 | 0.700 | 103.6 | 391.8 | 0.663 | 2.066 |
| 66 | 46.02 | 45.98 | 1398.6 | 1.984 | 1.375 | 0.705 | 106.3 | 393.0 | 0.676 | 2.058 |
| -64 | 51.73 | 51.68 | 1392.5 | 2.213 | 1.377 | 0.710 | 109.1 | 394.1 | 0.689 | 2.051 |
| -62 | 58.00 | 57.94 | 1386.4 | 2.463 | 1.378 | 0.715 | 111.9 | 395.3 | 0.702 | 2.044 |
| 60 | 64.87 | 64.80 | 1380.2 | 2.734 | 1.379 | 0.720 | 114.6 | 396.4 | 0.715 | 2.037 |
| -58 | 72.38 | 72.29 | 1374.0 | 3.030 | 1.380 | 0.726 | 117.4 | 397.6 | 0.728 | 2.030 |
| 56 | 80.57 | 80.46 | 1367.8 | 3.350 | 1.382 | 0.732 | 120.1 | 398.7 | 0.741 | 2.023 |
| -54 | 89.49 | 89.36 | 1361.6 | 3.696 | 1.384 | 0.737 | 122.9 | 399.8 | 0.754 | 2.017 |
| -52 | 99.18 | 99.03 | 1355.3 | 4.071 | 1.386 | 0.744 | 125.7 | 400.9 | 0.766 | 2.010 |
| -51.58 | 101.32 | 101.17 | 1354.0 | 4.153 | 1.386 | 0.745 | 126.3 | 401.1 | 0.769 | 2.009 |
| 50 | 109.69 | 109.51 | 1349.0 | 4.474 | 1.388 | 0.750 | 128.5 | 402.0 | 0.779 | 2.004 |
| -48 | 121.07 | 120.85 | 1342.7 | 4.909 | 1.391 | 0.756 | 131.2 | 403.1 | 0.791 | 1.998 |
| 46 | 133.36 | 133.11 | 1336.3 | 5.377 | 1.394 | 0.763 | 134.0 | 404.1 | 0.803 | 1.992 |
| 44 | 146.61 | 146.32 | 1330.0 | 5.880 | 1.397 | 0.770 | 136.8 | 405.2 | 0.816 | 1.987 |
| -42 | 160.89 | 160.55 | 1323.5 | 6.419 | 1.401 | 0.777 | 139.6 | 406.2 | 0.828 | 1.981 |
| -40 | 176.24 | 175.85 | 1317.0 | 6.996 | 1.405 | 0.785 | 142.4 | 407.3 | 0.840 | 1.976 |
| -38 | 192.71 | 192.27 | 1310.5 | 7.614 | 1.409 | 0.792 | 145.3 | 408.3 | 0.852 | 1.970 |
| -36 | 210.37 | 209.86 | 1304.0 | 8.275 | 1.414 | 0.800 | 148.1 | 409.3 | 0.864 | 1.965 |
| -34 | 229.26 | 228.69 | 1297.3 | 8.980 | 1.419 | 0.809 | 150.9 | 410.2 | 0.875 | 1.960 |
| 32 | 249.46 | 248.81 | 1290.6 | 9.732 | 1.424 | 0.817 | 153.8 | 411.2 | 0.887 | 1.955 |
| 30 | 271.01 | 270.28 | 1283.9 | 10.53 | 1.430 | 0.826 | 156.6 | 412.1 | 0.899 | 1.950 |
| 28 | 293.99 | 293.16 | 1277.1 | 11.39 | 1.436 | 0.835 | 159.5 | 413.1 | 0.911 | 1.946 |
| 26 | 318.41 | 317.52 | 1270.2 | 12.29 | 1.442 | 0.844 | 162.4 | 414.0 | 0.922 | 1.941 |
| 24 | 344.44 | 343.41 | 1263.3 | 13.26 | 1.448 | 0.854 | 165.3 | 414.9 | 0.934 | 1.936 |
| -22 | 372.05 | 370.90 | 1256.3 | 14.28 | 1.455 | 0.864 | 168.2 | 415.7 | 0.945 | 1.932 |
| -20 | 401.34 | 400.06 | 1249.2 | 15.37 | 1.461 | 0.875 | 171.1 | 416.6 | 0.957 | 1.927 |
| -18 | 432.36 | 430.95 | 1242.0 | 16.52 | 1.468 | 0.886 | 174.1 | 417.4 | 0.968 | 1.923 |
| 16 | 465.20 | 463.64 | 1234.8 | 17.74 | 1.476 | 0.897 | 177.0 | 418.2 | 0.980 | 1.919 |
| -14 | 499.91 | 498.20 | 1227.5 | 19.04 | 1.483 | 0.909 | 180.0 | 419.0 | 0.991 | 1.914 |
| -12 | 536.58 | 534.69 | 1220.0 | 20.41 | 1.491 | 0.921 | 182.9 | 419.8 | 1.003 | 1.910 |
| 10 | 575.26 | 573.20 | 1212.5 | 21.86 | 1.499 | 0.933 | 185.9 | 420.5 | 1.014 | 1.906 |
| -8 | 616.03 | 613.78 | 1204.9 | 23.39 | 1.507 | 0.947 | 189.0 | 421.2 | 1.025 | 1.902 |
| -6 | 658.97 | 656.52 | 1197.2 | 25.01 | 1.516 | 0.960 | 192.0 | 421.9 | 1.036 | 1.898 |
| -4 | 704.15 | 701.49 | 1189.4 | 26.72 | 1.524 | 0.975 | 195.0 | 422.6 | 1.048 | 1.894 |
| -2 | 751.64 | 748.76 | 1181.4 | 28.53 | 1.533 | 0.990 | 198.1 | 423.2 | 1.059 | 1.890 |
| 0 | 801.52 | 798.41 | 1173.4 | 30.44 | 1.543 | 1.005 | 201.2 | 423.8 | 1.070 | 1.886 |
| 2 | 853.87 | 850.52 | 1165.3 | 32.46 | 1.552 | 1.022 | 204.3 | 424.4 | 1.081 | 1.882 |
| 4 | 908.77 | 905.16 | 1157.0 | 34.59 | 1.563 | 1.039 | 207.4 | 424.9 | 1.092 | 1.878 |
| 6 | 966.29 | 962.42 | 1148.6 | 36.83 | 1.573 | 1.057 | 210.5 | 425.5 | 1.103 | 1.874 |
| 8 | 1026.5 | 1022.4 | 1140.0 | 39.21 | 1.584 | 1.076 | 213.7 | 425.9 | 1.114 | 1.870 |
| 10 | 1089.5 | 1085.1 | 1131.3 | 41.71 | 1.596 | 1.096 | 216.8 | 426.4 | 1.125 | 1.866 |
| 12 | 1155.4 | 1150.7 | 1122.5 | 44.35 | 1.608 | 1.117 | 220.0 | 426.8 | 1.136 | 1.862 |
| 14 | 1224.3 | 1219.2 | 1113.5 | 47.14 | 1.621 | 1.139 | 223.2 | 427.2 | 1.147 | 1.859 |
| 16 | 1296.2 | 1290.8 | 1104.4 | 50.09 | 1.635 | 1.163 | 226.5 | 427.5 | 1.158 | 1.855 |
| 18 | 1371.2 | 1365.5 | 1095.1 | 53.20 | 1.650 | 1.188 | 229.7 | 427.8 | 1.169 | 1.851 |
| 20 | 1449.4 | 1443.4 | 1085.6 | 56.48 | 1.666 | 1.215 | 233.0 | 428.1 | 1.180 | 1.847 |
| 22 | 1530.9 | 1524.6 | 1075.9 | 59.96 | 1.683 | 1.243 | 236.4 | 428.3 | 1.191 | 1.843 |
| 24 | 1615.8 | 1609.2 | 1066.0 | 63.63 | 1.701 | 1.273 | 239.7 | 428.4 | 1.202 | 1.839 |
| 26 | 1704.2 | 1697.2 | 1055.9 | 67.51 | 1.721 | 1.306 | 243.1 | 428.6 | 1.214 | 1.834 |
| 28 | 1796.2 | 1788.9 | 1045.5 | 71.62 | 1.743 | 1.341 | 246.5 | 428.6 | 1.225 | 1.830 |
| 30 | 1891.9 | 1884.2 | 1034.9 | 75.97 | 1.767 | 1.379 | 249.9 | 428.6 | 1.236 | 1.826 |
| 32 | 1991.3 | 1983.2 | 1024.1 | 80.58 | 1.793 | 1.420 | 253.4 | 428.6 | 1.247 | 1.822 |
| 34 | 2094.5 | 2086.2 | 1012.9 | 85.48 | 1.822 | 1.465 | 256.9 | 428.4 | 1.258 | 1.817 |
| 36 | 2201.7 | 2193.1 | 1001.4 | 90.68 | 1.855 | 1.514 | 260.5 | 428.3 | 1.269 | 1.813 |
| 38 | 2313.0 | 2304.0 | 989.5 | 96.22 | 1.891 | 1.569 | 264.1 | 428.0 | 1.281 | 1.808 |
| 40 | 2428.4 | 2419.2 | 977.3 | 102.1 | 1.932 | 1.629 | 267.8 | 427.7 | 1.292 | 1.803 |
| 42 | 2548.1 | 2538.6 | 964.6 | 108.4 | 1.979 | 1.696 | 271.5 | 427.2 | 1.303 | 1.798 |
| 44 | 2672.2 | 2662.4 | 951.4 | 115.2 | 2.033 | 1.771 | 275.3 | 426.7 | 1.315 | 1.793 |
| 46 | 2800.7 | 2790.7 | 937.7 | 122.4 | 2.095 | 1.857 | 279.2 | 426.1 | 1.327 | 1.788 |
| 48 | 2933.7 | 2923.6 | 923.3 | 130.2 | 2.168 | 1.955 | 283.2 | 425.4 | 1.339 | 1.782 |
| 50 | 3071.5 | 3061.2 | 908.2 | 138.6 | 2.256 | 2.069 | 287.3 | 424.5 | 1.351 | 1.776 |
| 52 | 3214.0 | 3203.6 | 892.2 | 147.7 | 2.362 | 2.203 | 291.5 | 423.5 | 1.363 | 1.770 |
| 54 | 3361.4 | 3351.0 | 875.1 | 157.6 | 2.493 | 2.363 | 295.8 | 422.4 | 1.376 | 1.764 |
| 56 | 3513.8 | 3503.5 | 856.8 | 168.4 | 2.661 | 2.557 | 300.3 | 421.0 | 1.389 | 1.757 |
| 58 | 3671.3 | 3661.2 | 836.9 | 180.4 | 2.883 | 2.799 | 305.0 | 419.4 | 1.403 | 1.749 |
| 60 | 3834.1 | 3824.2 | 814.9 | 193.7 | 3.191 | 3.106 | 310.0 | 417.6 | 1.417 | 1.741 |
| 62 | 4002.1 | 3992.7 | 790.1 | 208.6 | 3.650 | 3.511 | 315.3 | 415.5 | 1.433 | 1.732 |
| 64 | 4175.7 | 4166.8 | 761.0 | 225.6 | 4.415 | 4.064 | 321.2 | 413.0 | 1.450 | 1.722 |

## 1.3.2 Refrigerant Cylinders

**Cylinder specifications**

➤ The cylinder is painted refrigerant color (pink).

➤ The cylinder valve is equipped with a siphon tube.




➤ Note:

**1** Refrigerant can be charged in liquid state with cylinder in upright position.

**2** Do not lay cylinder on its side during charging, since it causes refrigerant in gas state to enter the system.

**Handling of cylinders**

**1** Laws and regulations
R410A is liquefied gas, and the High-Pressure Gas Safety Law must be observed in handling them. Before using, refer to the High-Pressure Gas Safety Law.
The Law stipulates standards and regulations that must be followed to prevent accidents with high-pressure gases. Be sure to follow the regulations.

**2** Handing of vessels
Since R410A is high-pressure gas, it is contained in high-pressure vessels.
Although those vessels are durable and strong, careless handling can cause damage that can lead to unexpected accidents. Do not drop vessels, let them fall, apply impact or roll them on the ground.

**3** Storage
Although R410A is not flammable, it must be stored in a well-ventilated, cool, and dark place in the same way as any other high-pressure gases.
It should also be noted that high-pressure vessels are equipped with safety devices that releases gas when the ambient temperature reaches more than a certain level (fusible plug melts) and when the pressure exceeds a certain level (spring-type safety valve operates).

## 1.3.4 Service Tools

R410A is used under higher working pressure, compared to previous refrigerants (R22,R407C). Furthermore, the refrigerating machine oil has been changed from Suniso oil to Ether oil, and if oil mixing is occurred, sludge results in the refrigerants and causes other problems. Therefore, gauge manifolds and charge hoses that are used with a previous refrigerant (R22,R407C) can not be used for products that use new refrigerants.

Be sure to use dedicated tools and devices.

➤ Tool compatibility

| Tool | Compatibility | | | Reasons for change |
|---|---|---|---|---|
| | HFC | | HCFC | |
| | R410A | R407C | R22 | |
| Gauge manifold<br>Charge hose | X | | | ➤ Do not use the same tools for R22 and R410A.<br>➤ Thread specification differs for R410A and R407C. |
| Charging cylinder | X | | O | ➤ Weighting instrument used for HFCs. |
| Gas detector | O | | X | ➤ The same tool can be used for HFCs. |
| Vacuum pump<br>(pump with reverse flow preventive function) | O | | | ➤ To use existing pump for HFCs, vacuum pump adaptor must be installed. |
| Weighting instrument | O | | | |
| Charge mouthpiece | X | | | ➤ Seal material is different between R22 and HFCs.<br>➤ Thread specification is different between R410A and others. |
| Flaring tool (Clutch type) | O | | | ➤ For R410A, flare gauge is necessary. |
| Torque wrench | O | | | ➤ Torque-up for 1/2 and 5/8 |
| Pipe cutter | O | | | |
| Pipe expander | O | | | |
| Pipe bender | O | | | |
| Pipe assembling oil | X | | | ➤ Due to refrigerating machine oil change. (No Suniso oil can be used.) |
| Refrigerant recovery device | Check your recovery device. | | | |
| Refrigerant piping | See the chart below. | | | ➤ Only ϕ19.1 is changed to 1/2H material while the previous material is "O". |

As for the charge mouthpiece and packing, 1/2UNF20 is necessary for mouthpiece size of charge hose.

**Copper tube material and thickness**

| Pipe size | R407C | | R410A | |
|---|---|---|---|---|
| | Material | Thickness tmmj | Material | Thickness (*) tmmj |
| ϕ6.4 | O | 0.8 | O | 0.8 |
| ϕ9.5 | O | 0.8 | O | 0.8 |
| ϕ12.7 | O | 0.8 | O | 0.8 |
| ϕ15.9 | O | 1.0 | O | 1.0 |
| ϕ19.1 | O | 1.0 | 1/2H | 1.0 |

* O: Soft (Annealed)
H: Hard (Drawn)

(*) Pipe thickness may vary according to unit type. Refer to the Installation Manual for correct wall thickness.

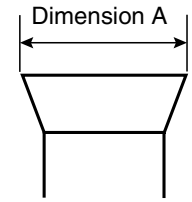
**Flaring tool**

Flare gauge

➤ Specifications
• Dimension A

| Nominal size | Tube O.D. | $A^{+0}_{-0.4}$ | |
|---|---|---|---|
| | Do | Class-2 (R410A) | Class-1 (Conventional) |
| 1/4 | 6.35 | 9.1 | 9.0 |
| 3/8 | 9.52 | 13.2 | 13.0 |
| 1/2 | 12.70 | 16.6 | 16.2 |
| 5/8 | 15.88 | 19.7 | 19.4 |
| 3/4 | 19.05 | 24.0 | 23.3 |

➤ Differences
• Change of dimension A




For class-1: R407C
For class-2: R410A

Conventional flaring tools can be used when the work process is changed. (change of work process)

Previously, a pipe extension margin of 0 to 0.5mm was provided for flaring. For R410A air conditioners, perform pipe flaring with a pipe extension margin of **1.0 to 1.5 mm**. (For clutch type only)

Conventional tool with pipe extension margin adjustment can be used.

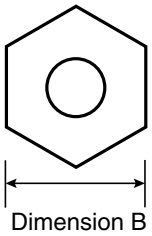
**Torque wrench**

➤ Specifications
• Dimension B Unit:mm

| Nominal size | Class-1 | Class-2 | Previous |
|---|---|---|---|
| 1/2 | 24 | 26 | 24 |
| 5/8 | 27 | 29 | 27 |

No change in tightening torque
No change in pipes of other sizes

➤ Differences
• Change of dimension B
Only 1/2", 5/8" are extended




For class-1: R407C
For class-2: R410A

**Vacuum pump with check valve**

Vacuum pump adaptor
(Reverse flow preventive vacuum adaptor)

➤ Specifications
- Discharge speed
  50 l/min (50Hz)
  60 l/min (60Hz)
- Suction port UNF7/16-20(1/4 Flare)
  UNF1/2-20(5/16 Flare) with adaptor
- Maximum degree of vacuum
  –100.7 kpa ( 5 torr – 755 mmHg)

➤ Differences
- Equipped with function to prevent reverse oil flow
- Previous vacuum pump can be used by installing adaptor.

**Leak tester**

➤ Specifications
- Hydrogen detecting type, etc.
- Applicable refrigerants
  R410A, R407C, R404A, R507A, R134a, etc.

➤ Differences
- Previous testers detected chlorine. Since HFCs do not contain chlorine, new tester detects hydrogen.

**Refrigerant oil (Air compal)**

➤ Specifications
- Contains synthetic oil, therefore it can be used for piping work of every refrigerant cycle.
- Offers high rust resistance and stability over long period of time.

➤ Differences
- Can be used for R410A and R22 units.

**Gauge manifold for R410A**

➤ Specifications
- High pressure gauge
  - 0.1 to 5.3 MPa (-76 cmHg to 53 kg/cm$^2$)
- Low pressure gauge
  - 0.1 to 3.8 MPa (-76 cmHg to 38 kg/cm$^2$)
- 1/4" → 5/16" (2min → 2.5min)
- No oil is used in pressure test of gauges.
  → For prevention of contamination
- Temperature scale indicates the relationship between pressure and temperature in gas saturated state.

➤ Differences
- Change in pressure
- Change in service port diameter

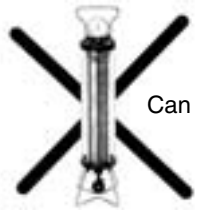
**Charge hose for R410A**

(Hose with ball valve)

➤ Specifications
- Working pressure 5.08 MPa (51.8 kg/cm$^2$)
- Rupture pressure 25.4 MPa (259 kg/cm$^2$)
- Available with and without hand-operate valve that prevents refrigerant from outflow.

➤ Differences
- Pressure proof hose
- Change in service port diameter
- Use of nylon coated material for HFC resistance

**Charging cylinder**



Can not be used

➤ Specifications
- Use weigher for refrigerant charge listed below to charge directly from refrigerant cylinder.

➤ Differences
- The cylinder can not be used for mixed refrigerant since mixing ratio is changed during charging.

  When R410A is charged in liquid state using charging cylinder, foaming phenomenon is generated inside charging cylinder.

**Weigher for refrigerant charge**

➤ Specifications
- High accuracy
  TA101A (for 10-kg cylinder) = ± 2g
  TA101B (for 20-kg cylinder) = ± 5g
- Equipped with pressure-resistant sight glass to check liquid refrigerant charging.
- A manifold with separate ports for HFCs and previous refrigerants is equipped as standard accessories.

➤ Differences
- Measurement is based on weight to prevent change of mixing ratio during charging.

**Charge mouthpiece**

➤ Specifications
- For R410A, 1/4"→ 5/16" (2min → 2.5min)
- Material is changed from CR to H-NBR.

➤ Differences
- Change of thread specification on hose connection side (For the R410A use)
- Change of sealer material for the HFCs use.

# Part 1
# System Outline

**What is in this part?** This part contains the following chapters:ì

1

# 1 General Outline: Outdoor Units

## 1.1 What Is in This Chapter?

**Introduction**

This chapter contains the following information on the outdoor units:

- ➤ Outlook and dimensions
- ➤ Installation and service space
- ➤ Components.

**General outline**

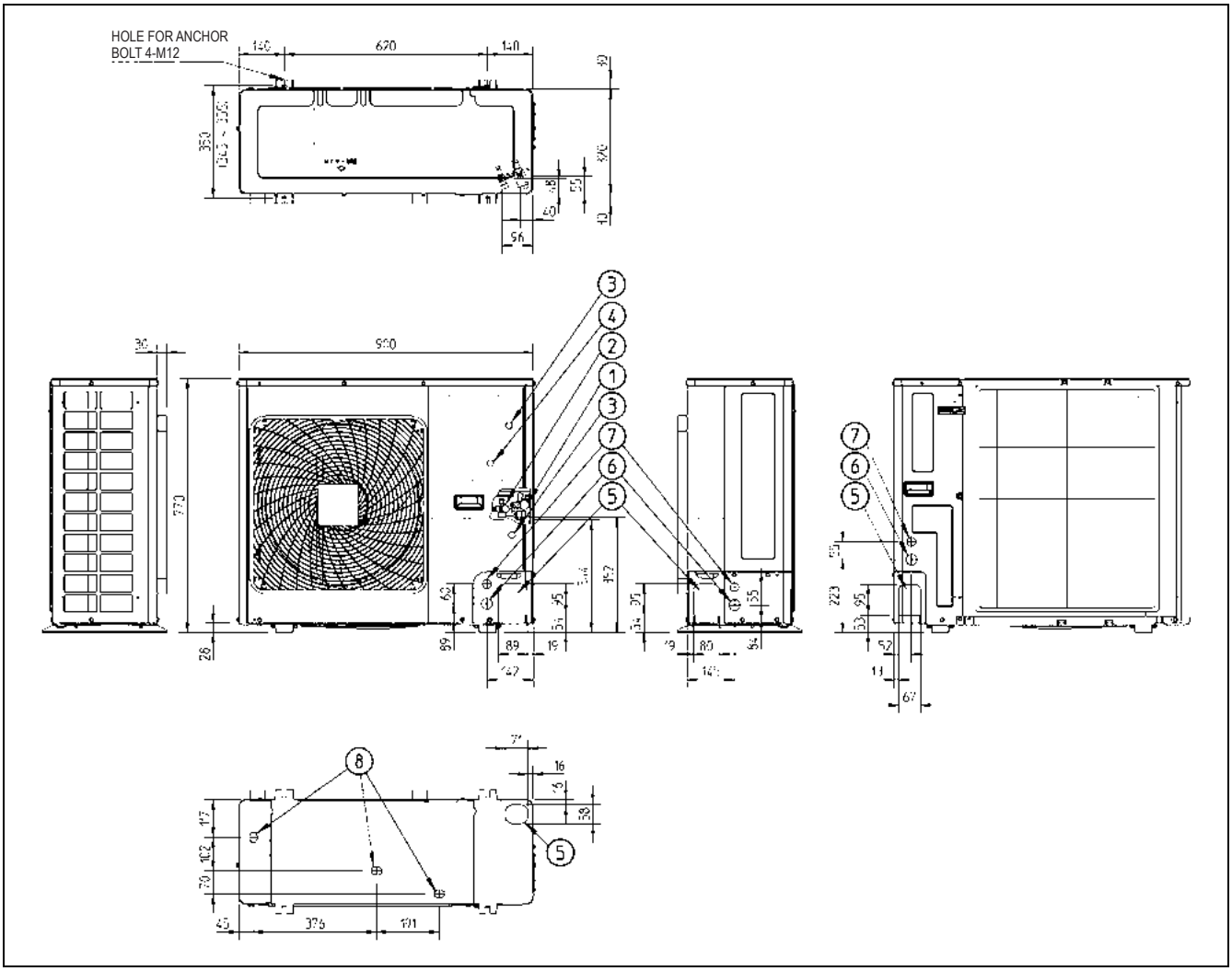
This chapter contains the following general outlines:

1

## 1.2 RR71 and RQ71: Outlook, Dimensions and Components

**Outlook and dimensions**

The illustration below shows the outlook and the dimensions of the unit (mm).




**Installation and service space**

See page 1–10.

**Components**

The table below contains the different components of the unit.

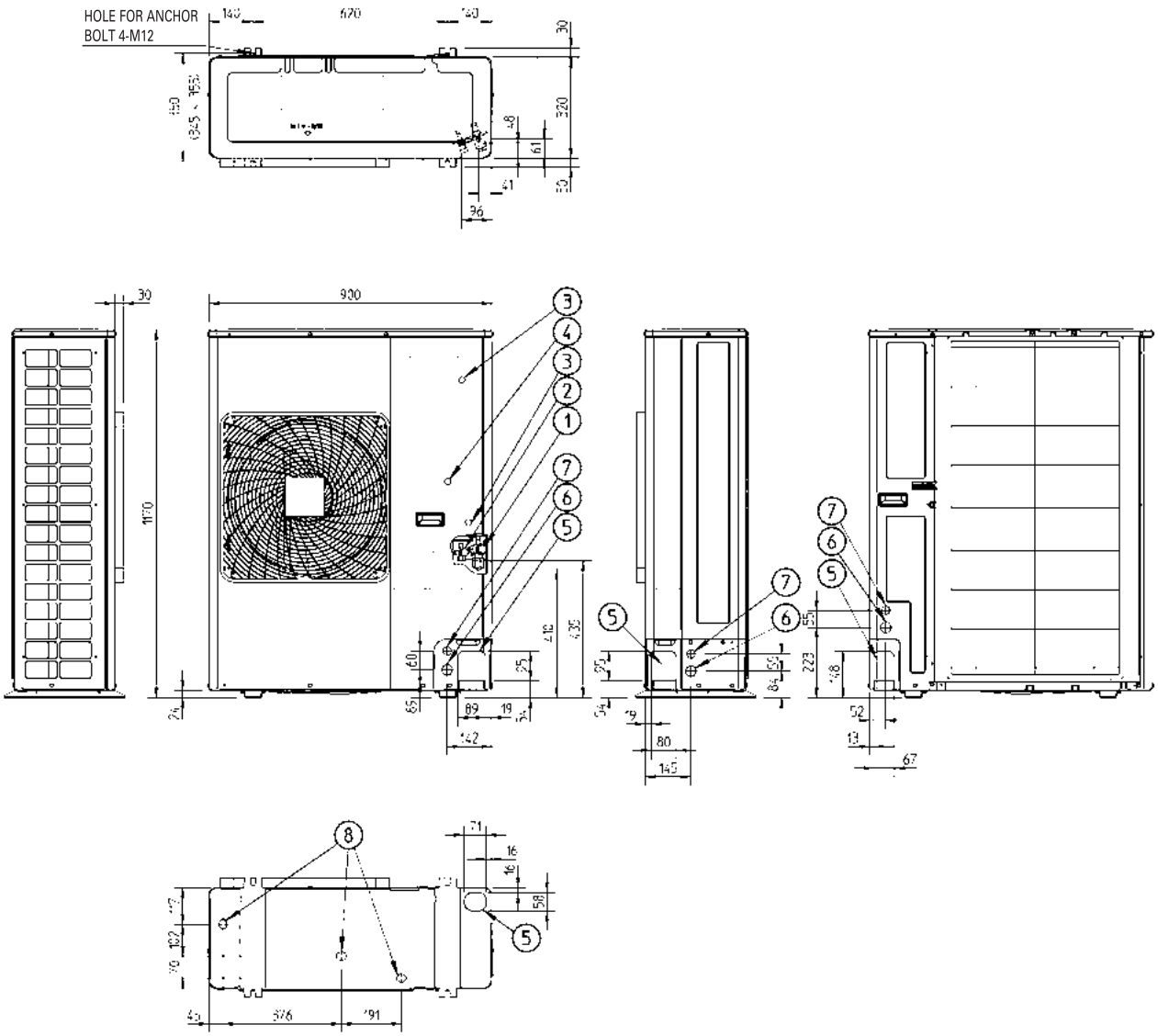
| No. | Component |
|---|---|
| 1 | Gas pipe connection |
| 2 | Liquid pipe connection |
| 3 | Service port (inside the unit) (for RQ71 only) |
| 4 | Grounding terminal M5 (inside the switch box) |
| 5 | Refrigerant piping intake |
| 6 | Power supply wiring intake |
| 7 | Control wiring intake |
| 8 | Drain outlet |

1

## 1.3 RR100 and RQ100: Outlook, Dimensions and Components

**Outlook and dimensions**

The illustration below shows the outlook and the dimensions of the unit (mm).




**Installation and service space**

See page 1–10.

**Components**

The table below contains the different components of the unit.

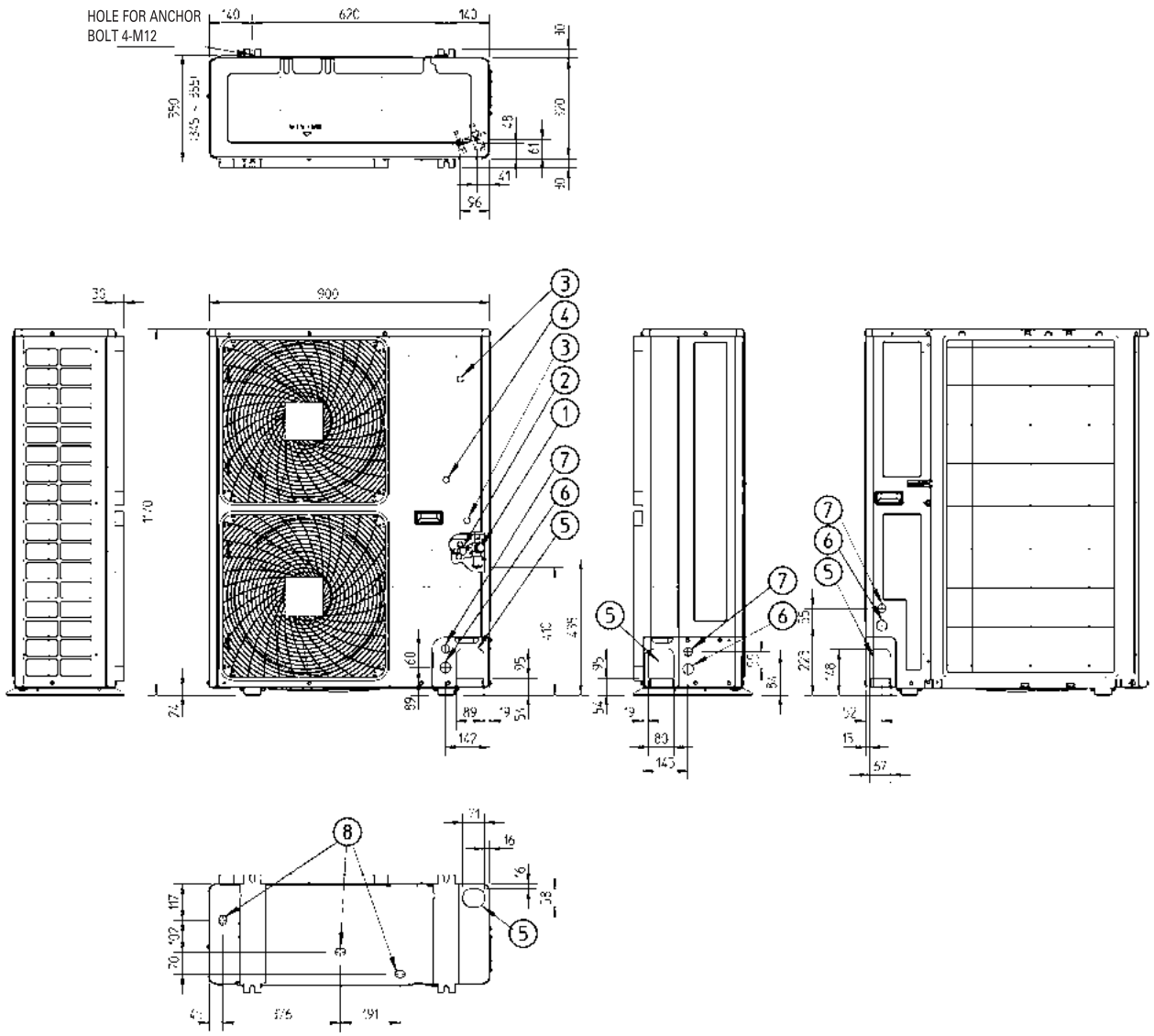
| No. | Component |
|---|---|
| 1 | Gas pipe connection |
| 2 | Liquid pipe connection |
| 3 | Service port (inside the unit) (for RQ100 only) |
| 4 | Grounding terminal M5 (inside the switch box) |
| 5 | Refrigerant piping intake |
| 6 | Power supply wiring intake |
| 7 | Control wiring intake |
| 8 | Drain outlet |

1

## 1.4 RR125 and RQ125: Outlook, Dimensions and Components

**Outlook and dimensions**

The illustration below shows the outlook and the dimensions of the unit (mm).




**Installation and service space**

See page 1–10.

**Components**

The table below contains the different components of the unit.

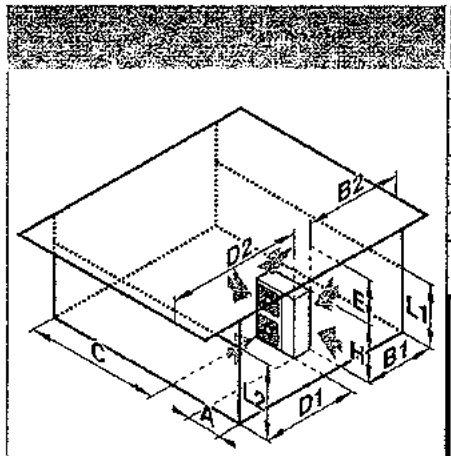
| No. | Component |
|---|---|
| 1 | Gas pipe connection |
| 2 | Liquid pipe connection |
| 3 | Service port (inside the unit) (for RQ125 only) |
| 4 | Grounding terminal M5 (inside the switch box) |
| 5 | Refrigerant piping intake |
| 6 | Power supply wiring intake |
| 7 | Control wiring intake |
| 8 | Drain outlet |

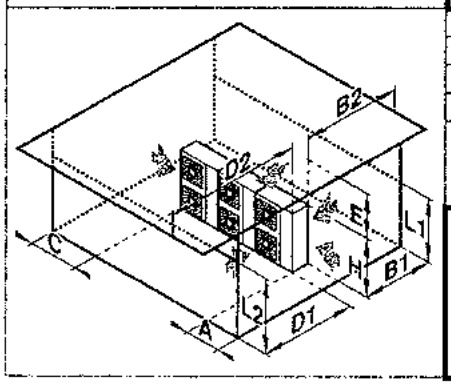
1

## 1.5 RR71, RR100, RR125, RQ71, RQ100 and RQ125: Installation and Service Space

**Non stacked**

The illustrations and table below show the required installation and service space (mm). The values in brackets are for the 100 and 125 class.




| | | | | | | | A | B1 | B2 | C | D1 | D2 | E | L1/L2 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ✓ | | | | | | | | ≥50(100) | | | | | | | |
| ✓ | | ✓ | ✓ | | | | ≥100 | ≥100 | | ≥100 | | | | | |
| ✓ | | | | ✓ | | | | ≥100 | | | | ≤500 | ≥1000 | | |
| ✓ | | ✓ | ✓ | ✓ | | | ≥150 | ≥150 | | ≥150 | | ≤500 | ≥1000 | | |
| | ✓ | | | | | | | | | | ≥500 | | | | |
| | ✓ | | | ✓ | | | | | ≤500 | | ≥500 | | ≥1000 | | |
| ✓ | ✓ | | | | L1<L2 | | | ≥50(100) | | | ≥500 | | | | |
| | | | | | L2<L1 | | | ≥50(100) | | | ≥500 | | | | |
| ✓ | ✓ | | | ✓ | L1<L2 | L1≤H | | ≥150(250) | ≤500 | | ≥750 | | ≥1000 | 0<L1≤1/2H | 1 |
| | | | | | | | | | | | ≥1000 | | | 0<L1≤1/2H | |
| | | | | | | L1>H | L1≤H | | | | | | | | |
| | | | | | L2<L1 | L2≤H | | ≥50(100) | | | ≥500 | ≥500 | ≥1000 | 0<L2≤1/2H | |
| | | | | | | | | ≥100(200) | | | | | | 1/2H<L2≤H | |
| | | | | | | L2>H | L2≤H | | | | | | | | |
| ✓ | | ✓ | ✓ | | | | ≥200 | ≥200(300) | | ≥1000 | | | | | |
| ✓ | | ✓ | ✓ | ✓ | | | ≥200 | ≥200(300) | | ≥1000 | | ≤500 | ≥1000 | | |
| | ✓ | | | | | | | | | | ≥1000 | | | | |
| | ✓ | | | ✓ | | | | | ≤500 | | ≥1000 | | ≥1000 | | |
| ✓ | ✓ | | | | L1<L2 | | | ≥200(300) | | | ≥1000 | | | | |
| | | | | | L2<L1 | | | ≥150(250) | | | ≥1000 | | | 0<L2≤1/2H | |
| | | | | | | | | ≥200(300) | | | | | | 1/2H<L2≤H | |
| ✓ | ✓ | | | ✓ | L1<L2 | L1≤H | | ≥200(300) | ≤500 | | ≥1000 | | ≥1000 | 0<L1≤1/2H | 1 |
| | | | | | | | | | | | ≥1250 | | | 1/2H<L1≤H | |
| | | | | | | L1>H | L1≤H | | | | | | | | |
| | | | | | L2<L1 | L2≤H | | ≥150(250) | | | ≥1000 | ≤500 | ≥1000 | 0<L2≤1/2H | 2 |
| | | | | | | | | ≥200(300) | | | | | | 1/2H<L2≤H | |
| | | | | | | L2>H | L2≤H | | | | | | | | |

Suction side obstacle

Discharge side obstacle

Left side obstacle

Right side obstacle

Top side obstacle

✓ Obstacle is present

**1** In these cases, close the bottom of the installation frame to prevent discharged air from being bypassed

**2** In these cases, only 2 units can be installed

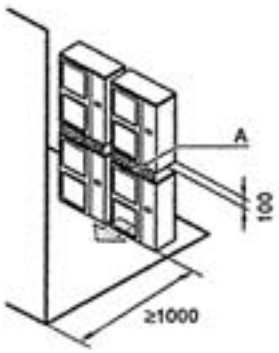
This situation is not allowed

**Stacked**

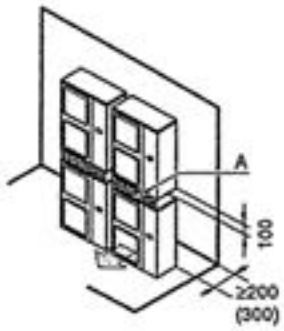
The illustration below shows the required installation and service space (mm). The values in brackets are for the 100 and 125 class.

- ➤ Do not stack more than one unit.
- ➤ ± 100 mm is required for the drain pipe on the outdoor unit.
- ➤ Seal A in order to prevent outlet air from bypassing.

With obstacles in front of the air outlet side



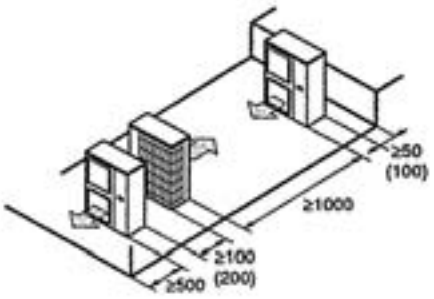

With obstacles in front of the air inlet side



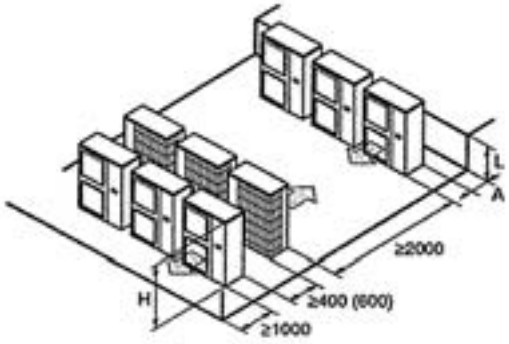

**Multiple rows**

The illustration below shows the required installation and service space (mm). The values in brackets are for the 100 and 125 class.

One unit per row




Multiple units per row




| | L | A |
|---|---|---|
| L ≤ H | 0<L≤1/2H | 150 (250) |
| | 1/2H < L | 200 (300) |
| H < L | installation impossible | |

1

# 2 Specifications

## 2.1 What Is in This Chapter?

**Introduction**

This chapter contains the following information:

- ➤ Technical specifications
- ➤ Electrical specifications.
- ➤ Electrical data

**Options**

For possible options, refer to OHE03-2 or the installation manual.

**Outdoor units**

This chapter contains the following specifications:



**Indoor units**

Refer to Indoor unit Service Manual ESIE05-04.

1

## 2.2 RR71, RR100 and RR125

### Technical specifications

The table below contains the technical specifications.

| Specification | | RR71B7V3B | RR71B7W1B | RR100B7V3B | RR100B7W1B | RR125B7W1B |
|---|---|---|---|---|---|---|
| Compressor | Model | JT90G-V1N | JT90G-YE | JT125G-V1N | JT125G-YE | JT160G-YE |
| | Type | Hermetically sealed scroll type | | | | |
| | Refrigerant oil type | DAPHNE FVC68D | | | | |
| | Oil charge | 1,5 liter | | | | |
| Outdoor Heat exchanger | Length | 857 mm | | | | |
| | Rows x stages x fin pitch | 2 x 34 x 2.0 mm | | 2 X 52 X 2.0 mm | | |
| | No of passes | 6 | | 10 | | |
| | Face area | 0.641 m² | | 0.980 m² | | |
| | Tube type | HI-XSS Cooling tube | | | | |
| | Fin type | Non sym. waffle louvre | | | | |
| | Empty tubeplate hole | 0 | | | | |
| | No of fans | 1 | | | | 2 |
| Fan | Nominal air flow (230V) cooling | 48 m³/min | | 55 m³/min | | 89 m³/min |
| | Fan motor model | P47L11S x 1 | | | | P47L11S x 2 |
| | Fan speed | 3 steps | | | | |
| Refrigerant circuit | Type | R410A | | | | |
| | Charge | 2.7 kg | | 3.7 kg | | |
| Safety and functional devices | | See page 1–19 and 3–19 | | | | |
| Heat insulation | | Both liquid and gas pipes | | | | |
| Machine weight | | 83 kg | 81 kg | 102 kg | 99 kg | 106 kg |

### Electrical specifications

The table below contains the electrical specifications.

| Specification | | RR71B7V3B | RR71B7W1B | RR100B7V3B | RR100B7W1B | RR125B7W1B |
|---|---|---|---|---|---|---|
| Unit | Phase | 1~ | 3N~ | 1~ | 3N~ | |
| | Voltage | 230 V | 400 V | 230 V | 400 V | |
| | Frequency | 50 Hz | | | | |
| | No. of wire connections | 3 wires for power supply (including earth wire) | 5 wires for power supply (including earth wire) | 3 wires for power supply (including earth wire) | 5 wires for power supply (including earth wire) | |
| | | 4 wires for connection with indoor (including earth wire) | | | | |
| | Power supply intake | Outdoor unit only | | | | |
| Compressor | Phase | 1~ | 3~ | 1~ | 3~ | |
| | Voltage | 230 V | 400 V | 230 V | 400 V | |
| | Starting method | Direct | | | | |
| | No. x motor output | 1x2200 W | | 1x3000 W | | 1x3750 W |
| Fan motor | Phase | 1~ | | | | |
| | Voltage | 230 V | | | | |
| | No. of motors x output | 1x65W | | 1x90 W | | 1x85 + 1x65 W |

1

## Electrical Data RR71

The table below contains the electrical specifications for RR71.

| Unit combination | | Power supply | | | | | Compressor | | OFM | | IFM | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Indoor unit | Outdoor unit | Hz-Volts | Voltage range | MCA | TOCA | MFA | LRA | RLA | kW | FLA | kW | FLA |
| FCQ71 | RR71B7V3B | 50-230 | Max.50Hz-264V Min.50Hz-198V | 15.3 | 23.2 | 32 | 75.5 | 11.3 | 0.065 | 0.6 | 0.045 | 0.6 |
| FUQ71 | RR71B7V3B | 50-230 | | 15.3 | 23.2 | 32 | 75.5 | 11.3 | 0.065 | 0.6 | 0.045 | 0.6 |
| FHQ71 | RR71B7V3B | 50-230 | | 15.8 | 23.2 | 32 | 75.5 | 11.7 | 0.065 | 0.6 | 0.062 | 0.6 |
| FAQ71 | RR71B7V3B | 50-230 | | 14.4 | 22.9 | 32 | 75.5 | 11.6 | 0.065 | 0.6 | 0.046 | 0.3 |
| FBQ71 | RR71B7V3B | 50-230 | | 15.0 | 23.5 | 32 | 75.5 | 10.8 | 0.065 | 0.6 | 0.125 | 0.9 |
| FCQ71 | RR71B7W1B | 50-400/230 | Max.50Hz-440/253 V Min.50Hz-360/197 V | 6.5 | 11.2 | 16 | 41.1 | 4.3 | 0.065 | 0.6 | 0.045 | 0.6 |
| FUQ71 | RR71B7W1B | 50-400/230 | | 6.5 | 11.2 | 16 | 41.1 | 4.2 | 0.065 | 0.6 | 0.045 | 0.6 |
| FHQ71 | RR71B7W1B | 50-400/230 | | 6.6 | 11.2 | 16 | 41.1 | 4.3 | 0.065 | 0.6 | 0.062 | 0.6 |
| FAQ71 | RR71B7W1B | 50-400/230 | | 6.3 | 10.9 | 16 | 41.1 | 4.3 | 0.065 | 0.6 | 0.046 | 0.3 |
| FBQ71 | RR71B7W1B | 50-400/230 | | 6.6 | 11.5 | 16 | 41.1 | 4.1 | 0.065 | 0.6 | 0.125 | 0.9 |

**Symbols:**

MCA: Min. Circuit Amps

TOCA: Total Over-current Amps

MFA: Max. Fuse Amps (see note 7)

LRA : Locked Rotor Amps

RLA : Rated Load Amps

OFM : Outdoor Fan Motor

IFM : Indoor Fan Motor

FLA : Full Load Amps

kW : Fan Motor Rated Output

**Notes:**

1. RLA is based on the following conditions:
   Indoor temp.: 27°CDB/19.5°CWB
   Outdoor temp. : 35°CDB.
2. TOCA means the total value of each OC set.
3. Voltage range
   Units are suitable for use on electrical systems where voltage supplied to unit terminals is not below or above listed operation range limits.
4. Maximum allowable voltage unbalance between phases is 2%.
5. MCA/MFA
   MCA = 1.25 x RLA + all FLA, MFA = < 2.25 x RLA + all FLA
   (next lower standard fuse rating Min. 16A).
6. Select wire size based on the larger value of MCA or TOCA.
7. Instead of fuse, use circuit breaker.

1

## Electrical Data RR100 and RR125

The table below contains the electrical specifications for RR100 and RR125.

| Unit combination | | Power supply | | | | | Compressor | | OFM | | IFM | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Indoor unit | Outdoor unit | Hz-Volts | Voltage range | MCA | TOCA | MFA | LRA | RLA | kW | FLA | kW | FLA |
| FCQ100 | RR100B7V3B | 50-230 | Max.50Hz-264V Min.50Hz-198V | 23.8 | 34.8 | 40 | 98.5 | 17.6 | 0.090 | 0.8 | 0.090 | 1.0 |
| FUQ100 | RR100B7V3B | 50-230 | | 23.3 | 34.8 | 40 | 98.5 | 17.2 | 0.090 | 0.8 | 0.090 | 1.0 |
| FHQ100 | RR100B7V3B | 50-230 | | 23.0 | 34.5 | 40 | 98.5 | 17.2 | 0.090 | 0.8 | 0.130 | 0.7 |
| FAQ100 | RR100B7V3B | 50-230 | | 23.0 | 34.2 | 40 | 98.5 | 17.4 | 0.090 | 0.8 | 0.049 | 0.4 |
| FBQ100 | RR100B7V3B | 50-230 | | 23.2 | 34.8 | 40 | 98.5 | 17.1 | 0.090 | 0.8 | 0.135 | 1.0 |
| FCQ100 | RR100B7W1B | 50-400/230 | Max.50Hz-440/253 V Min.50Hz-360/197 V | 9.2 | 11.8 | 16 | 48.2 | 5.9 | 0.090 | 0.8 | 0.090 | 1.0 |
| FUQ100 | RR100B7W1B | 50-400/230 | | 8.9 | 11.8 | 16 | 48.2 | 5.7 | 0.090 | 0.8 | 0.090 | 1.0 |
| FHQ100 | RR100B7W1B | 50-400/230 | | 8.6 | 11.5 | 16 | 48.2 | 5.7 | 0.090 | 0.8 | 0.130 | 0.7 |
| FAQ100 | RR100B7W1B | 50-400/230 | | 8.3 | 11.2 | 16 | 48.2 | 5.7 | 0.090 | 0.8 | 0.049 | 0.4 |
| FBQ100 | RR100B7W1B | 50-400/230 | | 8.9 | 11.8 | 16 | 48.2 | 5.7 | 0.090 | 0.8 | 0.135 | 1.0 |

| Unit combination | | Power supply | | | | | Compressor | | OFM | | IFM | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Indoor unit | Outdoor unit | Hz-Volts | Voltage range | MCA | TOCA | MFA | LRA | RLA | kW | FLA | kW | FLA |
| FCQ125 | RR125B7W1B | 50-400/230 | Max.50Hz-440/253 V Min.50Hz-360/197 V | 11.9 | 15.3 | 20 | 63 | 7.7 | 0.065 +0.085 | 0.6+ 0.7 | 0.090 | 1.0 |
| FUQ125 | RR125B7W1B | 50-400/230 | | 11.7 | 15.3 | 20 | 63 | 7.5 | 0.065 +0.085 | 0.6+ 0.7 | 0.090 | 1.0 |
| FHQ125 | RR125B7W1B | 50-400/230 | | 11.4 | 15.0 | 20 | 63 | 7.5 | 0.065 +0.085 | 0.6+ 0.7 | 0.130 | 0.7 |
| FBQ125 | RR125B7W1B | 50-400/230 | | 12.2 | 15.7 | 20 | 63 | 7.6 | 0.065 +0.085 | 0.6+ 0.7 | 0.225 | 1.4 |
| FDQ125 | RR125B7W1B | 50-400/230 | | 14.9 | 18.5 | 20 | 63 | 7.5 | 0.065 +0.085 | 0.6+ 0.7 | 0.500 | 4.2 |

**Symbols:**

MCA: Min. Circuit Amps

TOCA: Total Over-current Amps

MFA: Max. Fuse Amps (see note 7)

LRA : Locked Rotor Amps

RLA : Rated Load Amps

OFM : Outdoor Fan Motor

IFM : Indoor Fan Motor

FLA : Full Load Amps

kW : Fan Motor Rated Output

**Notes:**

1. RLA is based on the following conditions:
   Indoor temp.: 27°CDB/19.5°CWB
   Outdoor temp. : 35°CDB.
2. TOCA means the total value of each OC set.
3. Voltage range
   Units are suitable for use on electrical systems where voltage supplied to unit terminals is not below or above listed operation range limits.
4. Maximum allowable voltage unbalance between phases is 2%.
5. MCA/MFA
   MCA = 1.25 x RLA + all FLA, MFA = < 2.25 x RLA + all FLA
   (next lower standard fuse rating Min. 16A).
6. Select wire size based on the larger value of MCA or TOCA.
7. Instead of fuse, use circuit breaker.

## 2.3 RQ71, RQ100 and RQ125



### Technical specifications

The table below contains the technical specifications.

| Specification | | RQ71B7V3B | RQ71B7W1B | RQ100B7V3B | RQ100B7W1B | RQ125B7W1B |
|---|---|---|---|---|---|---|
| Compressor | Model | JT90G-V1N | JT90G-YE | JT125G-V1N | JT125G-YE | JT160G-YE |
| | Type | Hermetically sealed scroll type | | | | |
| | Refrigerant oil type | DAPHNE FVC68D | | | | |
| | Oil charge | 1.5 liter | | | | |
| Outdoor Heat exchanger | Length | 857 mm | | | | |
| | Rows x stages x fin pitch | 2 x 34 x 2.0 mm | | 2 x 52 x 2.0 mm | | |
| | No of passes | 6 | | 10 | | |
| | Face area | 0.641 m² | | 0.980 m² | | |
| | Tube type | HI-XSS Cooling tube | | | | |
| | Fin type | Non sym. waffle louvre | | | | |
| | Empty tubeplate hole | 0 | | | | |
| | No. of fans | 1 | | | | 2 |
| Fan | Nominal air flow (230 V) cooling | 48 m³/min | | 55 m³/min | | 89 m³/min |
| | Nominal air flow (230 V) Heating | 43 m³/min | | 50 m³/min | | 80 m³/min |
| | Fan motor model | P47L11S | | | | P47L11S x 2 |
| | Fan speed | 3 steps | | | | |
| Refrigerant circuit | Type | R410A | | | | |
| | Charge | 2.7 kg | | 3.7 kg | | |
| Safety and functional devices | | See page 1–19 and 3–19 | | | | |
| Heat insulation | | Both liquid and gas pipes | | | | |
| Machine weight | | 84 kg | 83 kg | 103 kg | 101 kg | 108 kg |

### Electrical specifications

The table below contains the electrical specifications.

| Specification | | RQ71B7V3B | RQ71B7W1B | RQ100B7V3B | RQ100B7W1B | RQ125B7W1B |
|---|---|---|---|---|---|---|
| Unit | Phase | 1~ | 3N~ | 1~ | 3N~ | 3N~ |
| | Voltage | 230 V | 400 V | 230 V | 400 V | 400 V |
| | Frequency | 50 Hz | | | | |
| | No. of wire connections | 3 wires for power supply (including earth wire) | 5 wires for power supply (including earth wire) | 3 wires for power supply (including earth wire) | 5 wires for power supply (including earth wire) | 5 wires for power supply (including earth wire) |
| | | 4 wires for connection with indoor (including earth wire) | 4 wires for connection with indoor (including earth wire) | 4 wires for connection with indoor (including earth wire) | 4 wires for connection with indoor (including earth wire) | 4 wires for connection with indoor (including earth wire) |
| | Power supply intake | Outdoor unit only | | | | |
| Compressor | Phase | 1~ | 3~ | 1~ | 3~ | |
| | Voltage | 230 V | 400 V | 230 V | 400 V | |
| | Starting method | Direct | | | | |
| | No. x motor output | 1x2200 W | | 1x3000 W | | 1x3750 W |
| Fan motor | Phase | 1~ | | | | |
| | Voltage | 230 V | | | | |
| | No. of motors x output | 1x65 W | | 1x90 W | | 1x85 + 1x65 W |

1

## Electrical Data

The table below contains the electrical specifications.

| Unit combination | | Power supply | | | | | Compressor | | OFM | | IFM | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Indoor unit | Outdoor unit | Hz-Volts | Voltage range | MCA | TOCA | MFA | LRA | RLA | kW | FLA | kW | FLA |
| FCQ71 | RQ71B7V3B | 50-230 | Max.50Hz-264V Min.50Hz-198V | 15.3 | 23.2 | 32 | 75.5 | 11.3 | 0.065 | 0.6 | 0.045 | 0.6 |
| FUQ71 | RQ71B7V3B | 50-230 | | 15.3 | 23.2 | 32 | 75.5 | 11.3 | 0.065 | 0.6 | 0.045 | 0.6 |
| FHQ71 | RQ71B7V3B | 50-230 | | 16.3 | 23.2 | 32 | 75.5 | 12.1 | 0.065 | 0.6 | 0.062 | 0.6 |
| FAQ71 | RQ71B7V3B | 50-230 | | 15.4 | 22.9 | 32 | 75.5 | 11.6 | 0.065 | 0.6 | 0.046 | 0.3 |
| FBQ71 | RQ71B7V3B | 50-230 | | 15.0 | 23.5 | 32 | 75.5 | 10.8 | 0.065 | 0.6 | 0.125 | 0.9 |
| FCQ71 | RQ71B7W1B | 50-400/230 | Max.50Hz-440/253 V Min.50Hz-360/197 V | 6.5 | 11.2 | 16 | 41.1 | 4.3 | 0.065 | 0.6 | 0.045 | 0.6 |
| FUQ71 | RQ71B7W1B | 50-400/230 | | 6.5 | 11.2 | 16 | 41.1 | 4.2 | 0.065 | 0.6 | 0.045 | 0.6 |
| FHQ71 | RQ71B7W1B | 50-400/230 | | 6.7 | 11.2 | 16 | 41.1 | 4.4 | 0.065 | 0.6 | 0.062 | 0.6 |
| FAQ71 | RQ71B7W1B | 50-400/230 | | 6.3 | 10.9 | 16 | 41.1 | 4.3 | 0.065 | 0.6 | 0.046 | 0.3 |
| FBQ71 | RQ71B7W1B | 50-400/230 | | 6.6 | 11.5 | 16 | 41.1 | 4.1 | 0.065 | 0.6 | 0.125 | 0.9 |

| Unit combination | | Power supply | | | | | Compressor | | OFM | | IFM | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Indoor unit | Outdoor unit | Hz-Volts | Voltage range | MCA | TOCA | MFA | LRA | RLA | kW | FLA | kW | FLA |
| FCQ100 | RQ100B7V3B | 50-230 | Max.50Hz-264V Min.50Hz-198V | 23.8 | 34.8 | 40 | 98.5 | 17.6 | 0.090 | 0.8 | 0.090 | 1.0 |
| FUQ100 | RQ100B7V3B | 50-230 | | 23.3 | 34.8 | 40 | 98.5 | 17.2 | 0.090 | 0.8 | 0.090 | 1.0 |
| FHQ100 | RQ100B7V3B | 50-230 | | 25.3 | 34.5 | 40 | 98.5 | 19.0 | 0.090 | 0.8 | 0.130 | 0.7 |
| FAQ100 | RQ100B7V3B | 50-230 | | 24.5 | 34.2 | 40 | 98.5 | 18.6 | 0.090 | 0.8 | 0.049 | 0.4 |
| FBQ100 | RQ100B7V3B | 50-230 | | 23.2 | 34.8 | 40 | 98.5 | 17.1 | 0.090 | 0.8 | 0.135 | 1.0 |
| FCQ100 | RQ100B7W1B | 50-400/230 | Max.50Hz-440/253 V Min.50Hz-360/197 V | 9.2 | 11.8 | 16 | 48.2 | 5.9 | 0.090 | 0.8 | 0.090 | 1.0 |
| FUQ100 | RQ100B7W1B | 50-400/230 | | 8.9 | 11.8 | 16 | 48.2 | 5.7 | 0.090 | 0.8 | 0.090 | 1.0 |
| FHQ100 | RQ100B7W1B | 50-400/230 | | 9.4 | 11.5 | 16 | 48.2 | 6.3 | 0.090 | 0.8 | 0.130 | 0.7 |
| FAQ100 | RQ100B7W1B | 50-400/230 | | 8.8 | 11.2 | 16 | 48.2 | 6.1 | 0.090 | 0.8 | 0.049 | 0.4 |
| FBQ100 | RQ100B7W1B | 50-400/230 | | 8.9 | 11.8 | 16 | 48.2 | 5.7 | 0.090 | 0.8 | 0.135 | 1.0 |

| Unit combination | | Power supply | | | | | Compressor | | OFM | | IFM | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Indoor unit | Outdoor unit | Hz-Volts | Voltage range | MCA | TOCA | MFA | LRA | RLA | kW | FLA | kW | FLA |
| FCQ125 | RQ125B7W1B | 50-400/230 | Max.50Hz-440/253 V Min.50Hz-360/197 V | 12.4 | 15.3 | 20 | 63 | 8.1 | 0.065 +0.085 | 0.6+ 0.7 | 0.090 | 1.0 |
| FUQ125 | RQ125B7W1B | 50-400/230 | | 12.2 | 15.3 | 20 | 63 | 7.9 | 0.065 +0.085 | 0.6+ 0.7 | 0.090 | 1.0 |
| FHQ125 | RQ125B7W1B | 50-400/230 | | 12.3 | 15.0 | 20 | 63 | 8.2 | 0.065 +0.085 | 0.6+ 0.7 | 0.130 | 0.7 |
| FBQ125 | RQ125B7W1B | 50-400/230 | | 12.2 | 15.7 | 20 | 63 | 7.6 | 0.065 +0.085 | 0.6+ 0.7 | 0.225 | 1.4 |
| FDQ125 | RQ125B7W1B | 50-400/230 | | 14.9 | 18.5 | 20 | 63 | 7.5 | 0.065 +0.085 | 0.6+ 0.7 | 0.500 | 4.2 |

**Symbols:**

MCA: Min. Circuit Amps

TOCA: Total Over-current Amps

MFA: Max. Fuse Amps (see note 7)

LRA : Locked Rotor Amps

RLA : Rated Load Amps

OFM : Outdoor Fan Motor

IFM : Indoor Fan Motor

FLA : Full Load Amps

kW : Fan Motor Rated Output

**Notes:**

1. RLA is based on the following conditions:
   Indoor temp.: 27°CDB/19.5°CWB
   Outdoor temp. : 35°CDB.
2. TOCA means the total value of each OC set.
3. Voltage range
   Units are suitable for use on electrical systems where voltage supplied to unit terminals is not below or above listed operation range limits.
4. Maximum allowable voltage unbalance between phases is 2%.
5. MCA/MFA
   MCA = 1.25 x RLA + all FLA, MFA = < 2.25 x RLA + all FLA (next lower standard fuse rating Min. 16A).
6. Select wire size based on the larger value of MCA or TOCA.
7. Instead of fuse, use circuit breaker.

1

# 3 Functional Diagrams

## 3.1 What Is in This Chapter?

**Introduction**

This chapter contains the following information:

- ➤ Functional diagrams
- ➤ Pipe connection diameters.

**Functional diagrams**

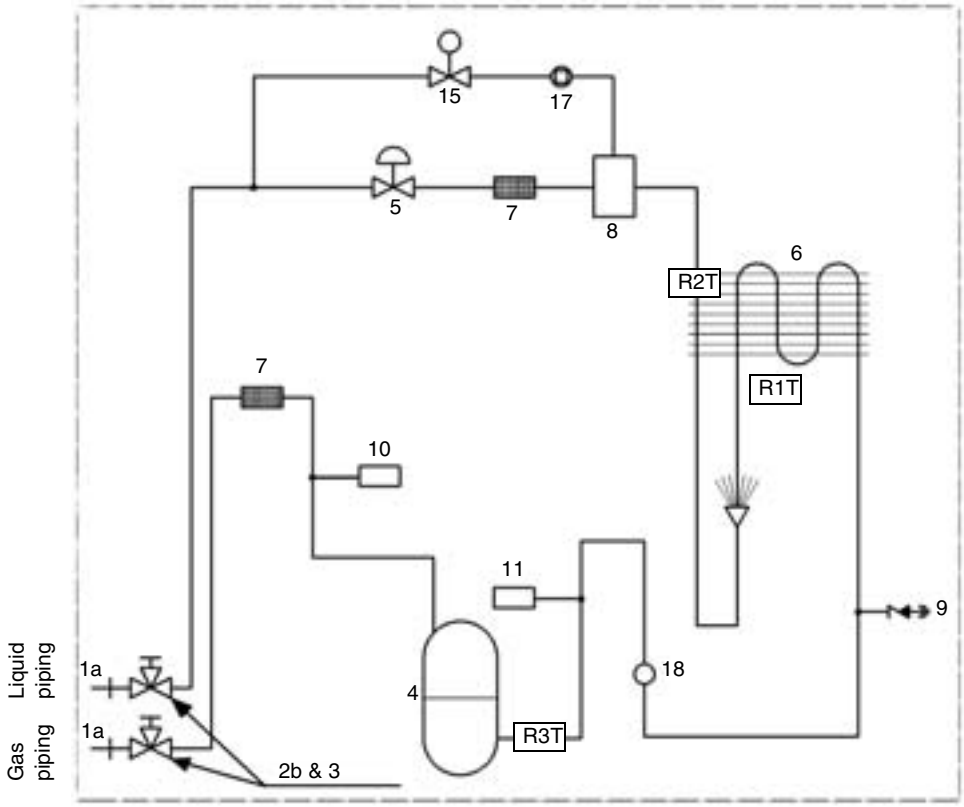
This chapter contains the following functional diagrams:

1

## 3.2 RR71B7, RR100B7 and RR125B7

**Functional diagram**

The illustration below shows the functional diagram of the refrigeration circuit.

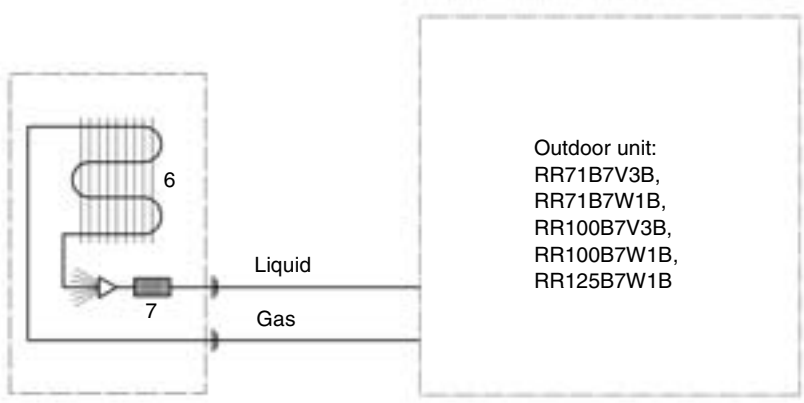



**Components**

For a description of the components, see 'Piping Components' on page 1–29.

**Pair system**

The illustration below shows the functional diagram of the refrigeration circuit.




**Pipe connection diameters**

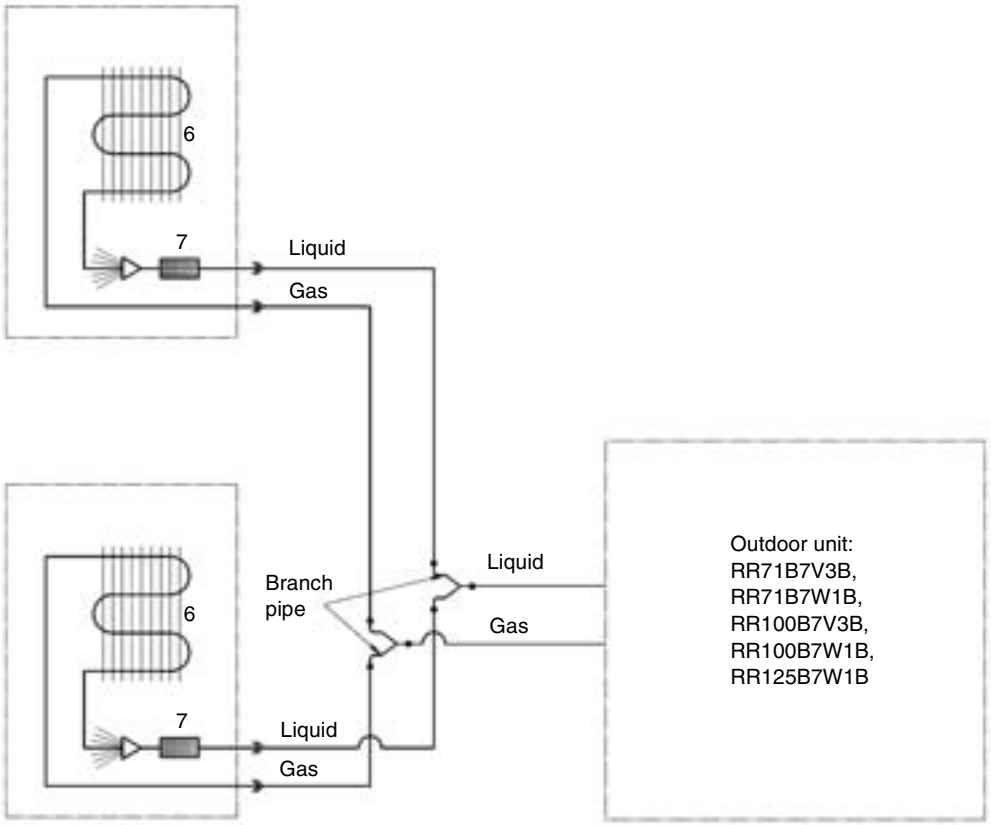
The table below contains the refrigerant pipe connection diameters (O.D.).

| **Model** | ∅ **Gas pipe (flare)** | ∅ **Liquid pipe (flare)** |
|---|---|---|
| RR71B7V3B | 15.9 mm | 9.5 mm |
| RR71B7W1B | | |
| RR100B7V3B | | |
| RR100B7W1B | | |
| RR125B7W1B | | |

1

**Twin system**

The illustration below shows the functional diagram of the refrigeration circuit.




**Pipe connection diameters**

The table below contains the refrigerant pipe connection diameters (O.D.).

| Model | ∅ Gas pipe (flare) | ∅ Liquid pipe (flare) |
|---|---|---|
| RR71B7V3B | 15.9 mm | 9.5 mm |
| RR71B7W1B | | |
| RR100B7V3B | | |
| RR100B7W1B | | |
| RR125B7W1B | | |

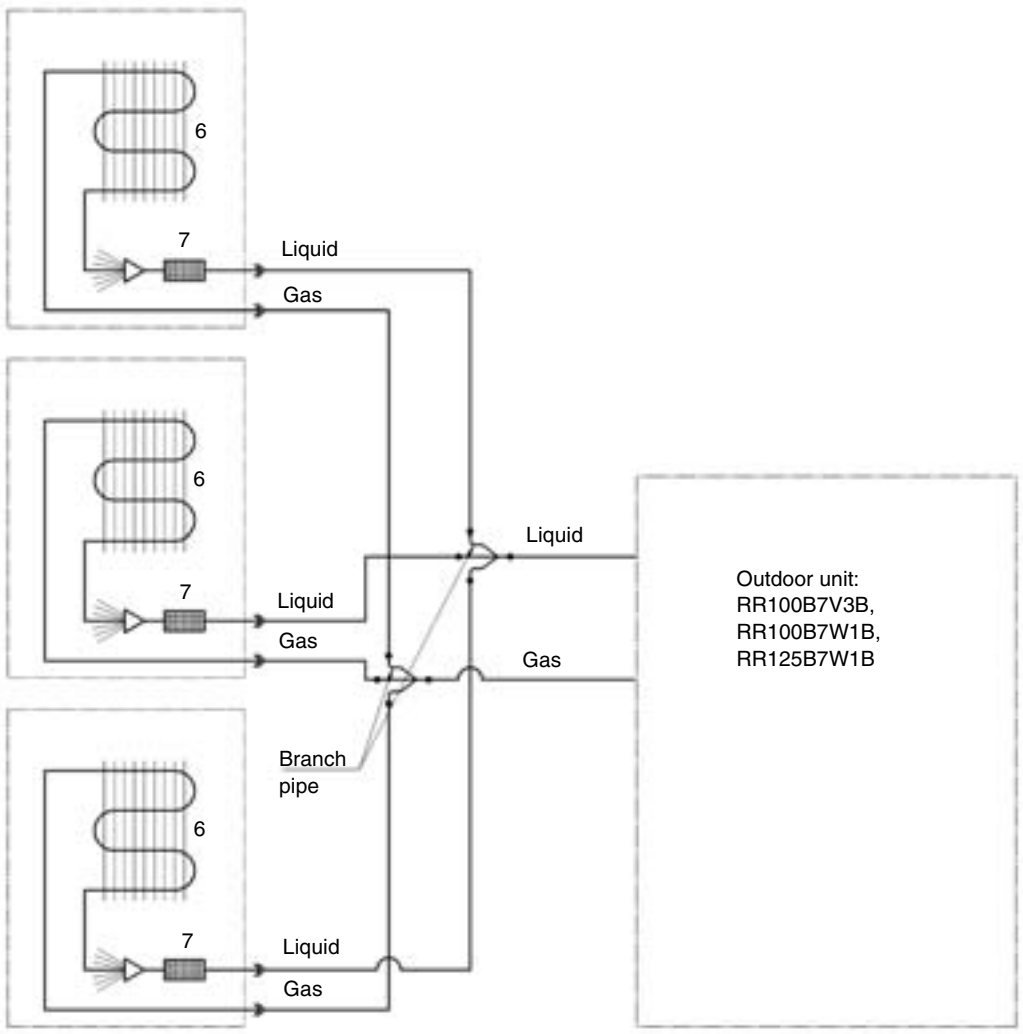
**Note**

The pipes between the branch and the indoor units should have the same size as the indoor connections.

1

**Triple system**

The illustration below shows the functional diagram of the refrigeration circuit.




**Pipe connection diameters**

The table below contains the refrigerant pipe connection diameters (O.D.).

| Model | ∅ Gas pipe (flare) | ∅ Liquid pipe (flare) |
|---|---|---|
| RR100B7V3B | 15.9 mm | 9.5 mm |
| RR100B7W1B | | |
| RR125B7W1B | | |

**Note**

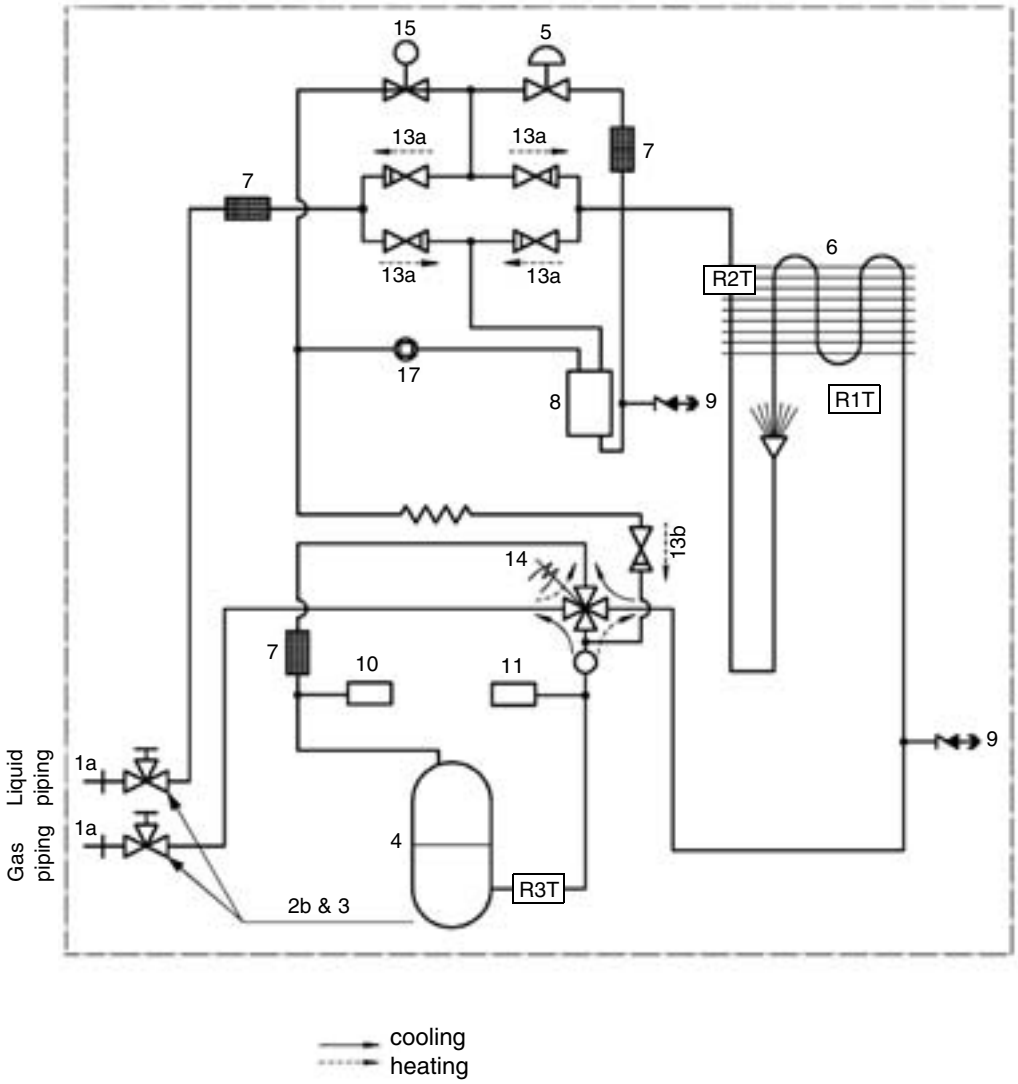
The pipes between the branch and the indoor units should have the same size as the indoor connections.

1

## 3.3 RQ71B7, RQ100B7 and RQ125B7

**Functional diagram**

The illustration below shows the functional diagram of the refrigeration circuit.



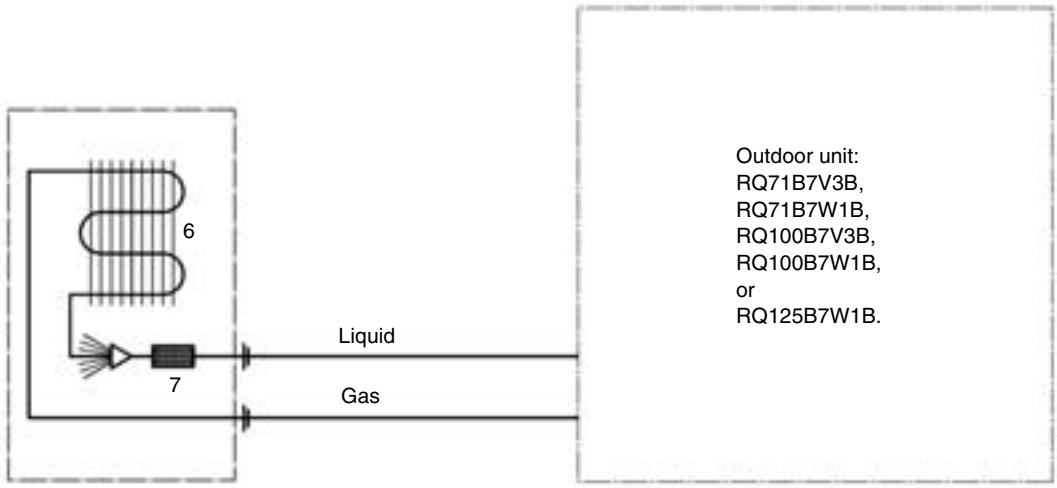

**Components**

For a description of the components, see 'Piping Components' on page 1–29.

1

**Pair system**

The illustration below shows the functional diagram of the refrigeration circuit.




**Pipe connection diameters**

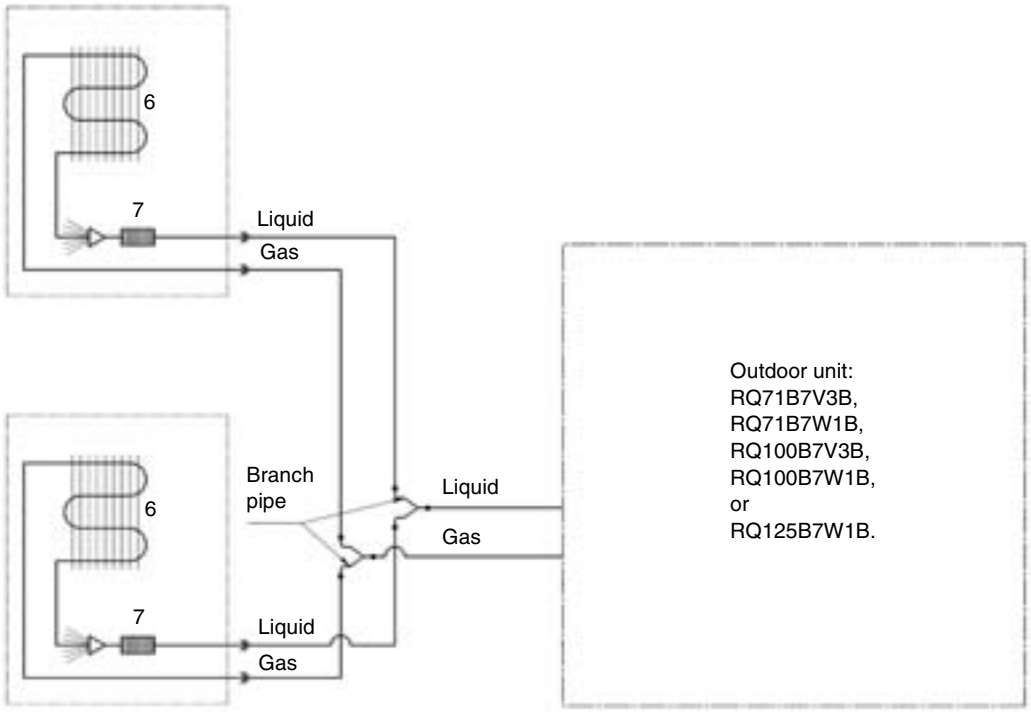
The table below contains the refrigerant pipe connection diameters (O.D.).

| **Model** | ∅ **Gas pipe (flare)** | ∅ **Liquid pipe (flare)** |
|---|---|---|
| RQ71B7V3B | 15.9 mm | 9.5 mm |
| RQ71B7W1B | | |
| RQ100B7V3B | | |
| RQ100B7W1B | | |
| RQ125B7W1B | | |

1

**Twin system**

The illustration below shows the functional diagram of the refrigeration circuit.




**Pipe connection diameters**

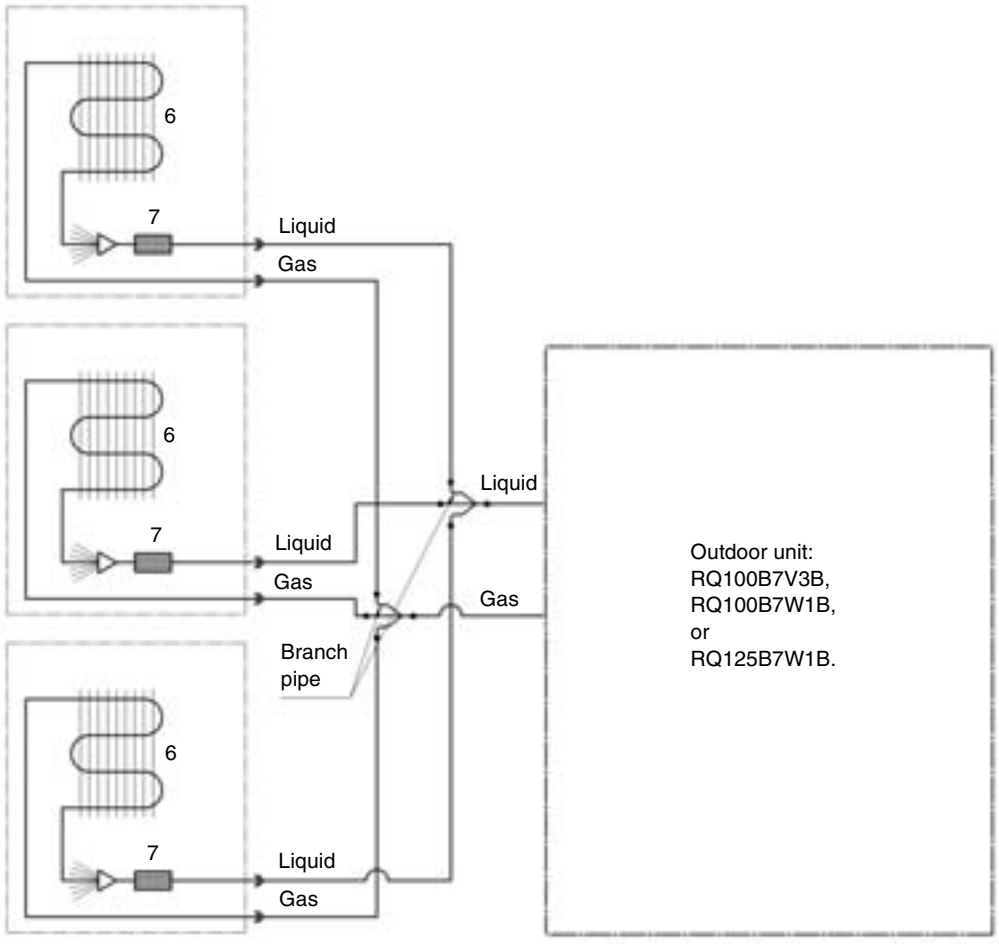
The table below contains the refrigerant pipe connection diameters (O.D.).

| **Model** | ∅ **Gas pipe (flare)** | ∅ **Liquid pipe (flare)** |
|---|---|---|
| RQ71B7V3B | 15.9 mm | 9.5 mm |
| RQ71B7W1B | | |
| RQ100B7V3B | | |
| RQ100B7W1B | | |
| RQ125B7W1B | | |

1

**Triple system**

The illustration below shows the functional diagram of the refrigeration circuit.




**Pipe connection diameters**

The table below contains the refrigerant pipe connection diameters (O.D.).

| **Model** | ∅ **Gas pipe (flare)** | ∅ **Liquid pipe (flare)** |
|---|---|---|
| RQ100B7V3B | 15.9 mm | 9.5 mm |
| RQ100B7W1B | | |
| RQ125B7W1B | | |

1

## 3.4 Piping Components

**Components**

The table below contains the different components of the functional diagrams.

| No. | Component | Function / remark |
|---|---|---|
| 1a | Flare connection | See pipe connection diameter. |
| 2b | Liquid stop valve with service port | The liquid stop valve is used as shut-off valve in case of a pump-down. |
| 3 | Gas stop valve with service port | The gas stop valve is used as shut-off valve in case of a pump-down. |
| 4 | Compressor | The compressor can restart after 3 min from last stop. |
| 5 | Electronic expansion valve | The expansion valve expands the liquid to enable evaporation in the evaporator. The opening degree is controlled to obtain the optimum discharge temperature. |
| 6 | Heat exchanger | The heat exchanger is of the multi louvre fin type. Hi-X -tubes and coated waffle louvre fins are used. |
| 7 | Filter | The filter is used to collect impurities, which may enter the system during installation and is also used to avoid blockage of the capillaries and other fine mechanical parts of the unit. |
| 8 | Liquid receiver | The liquid receiver is used to make sure only completely liquefied refrigerant is sent to the expansion valve. It is also used as a container in which surplus refrigerant is stored. |
| 9 | Check valve with service port | The check valve allows you to connect a gauge. |
| 10 | Low-pressure switch | The low-pressure switch stops the operation of the unit when the pressure becomes abnormally low. |
| 11 | High-pressure switch | The high-pressure switch stops the operation of the unit when the pressure becomes abnormally high. |
| 12 | Propeller fan and fan motor | The propeller fan creates air displacement across the heat exhanger. |
| 13a | One-way valve | The one-way valve is used to force the refrigerant liquid to flow through the receiver and the expansion valve in the same direction both in cooling and heating. |
| 13b | One-way valve | The one-way valve is used to release overpressure in the liquid receiver during stand-still. |
| 14 | 4-way valve<br>(reversing solenoid valve) | The 4-way valve is used to select refrigerant flow in cooling or heating mode.<br>When the 4-way valve switches from ON to OFF, a timer starts counting up to 150 as soon as the cooling or defrosting operation is stopped. This delay time is to eliminate the switching sound. |
| 15 | Solenoid valve | ➤ SV: Solenoid valve (Purge liquid receiver) |
| 16 | Thermistor | ➤ R1T: Air thermistor<br>➤ R2T: Coil thermistor<br>➤ R3T: Discharge pipe thermistor |
| 17 | Strainer | |
| 18 | Muffler | The muffler is mounted in the discharge line to absorb discharge pulsations from the compressor. It's also used to fit the discharge pipe thermistor. |

# 4 Switch Box Layout

## 4.1 What Is in This Chapter?

**Introduction**

This chapter shows the switch box components.

**Outdoor units**

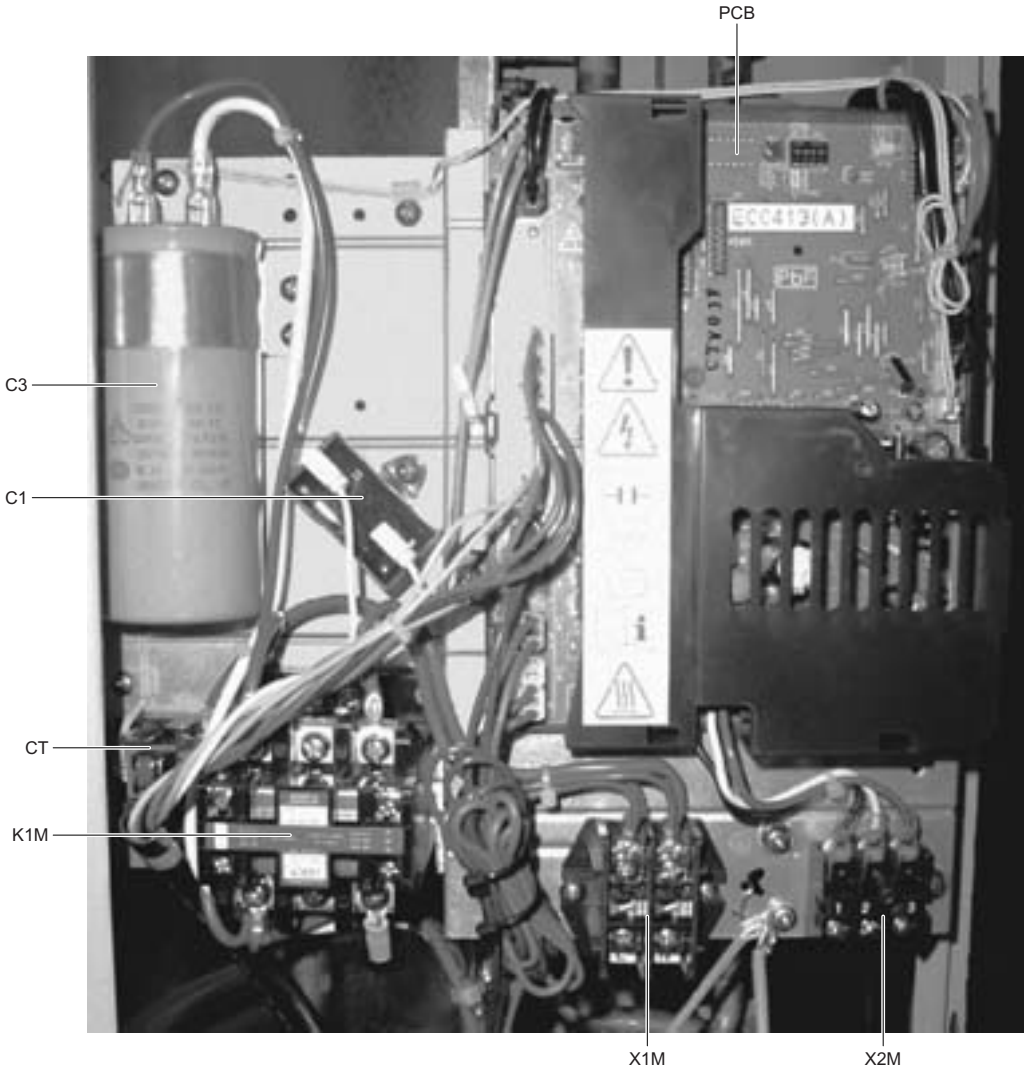
This chapter contains the following switch box layouts:

1

## 4.2 RR/RQ71~100B7V3B

**Switch box**

The illustration below shows the switch box layout.




**Components**

The table below contains the components of the switch box.

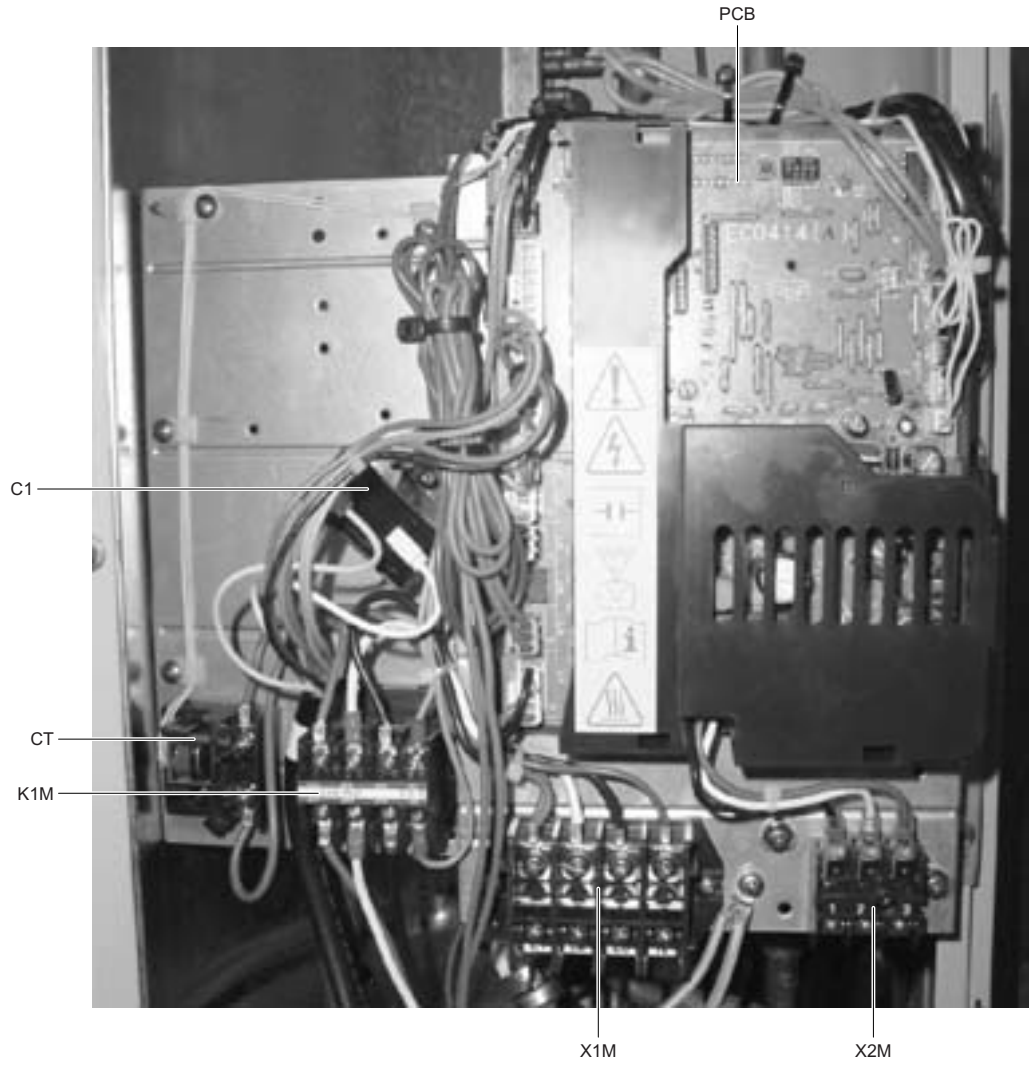
| Symbol | Component |
|---|---|
| PCB | Printed Circuit Board |
| C1 | Fan motor capacitor (M1F) |
| C3 | Compressor capacitor (M1C) |
| CT | Current transformer |
| K1M | Magnetic contactor compressor |
| X1M | Terminal strip power supply |
| X2M | Terminal strip interconnection wiring |

## 4.3 RR/RQ71~100B7W1B



**Switch box**

The illustration below shows the switch box layout.




**Components**

The table below contains the components of the switch box.

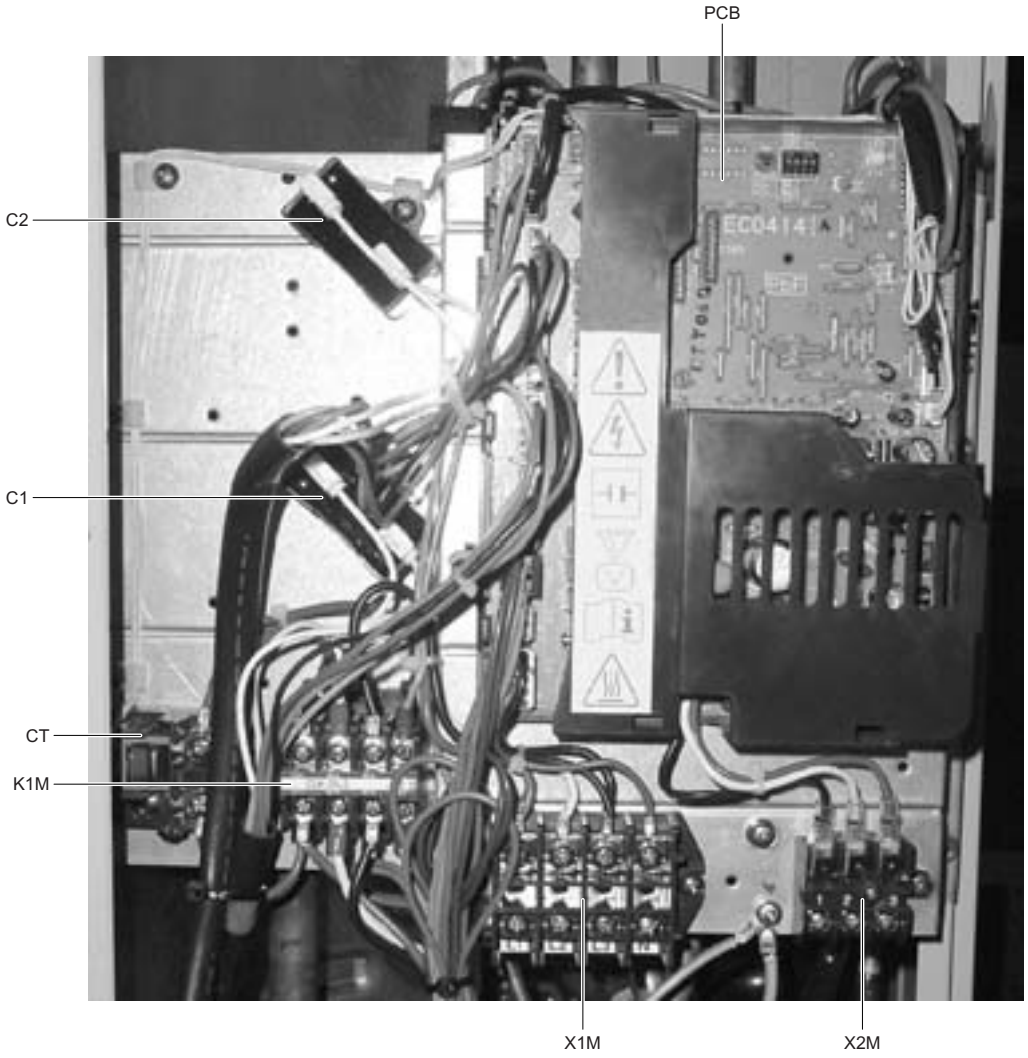
| Symbol | Component |
|---|---|
| PCB | Printed Circuit Board |
| C1 | Fan motor capacitor (M1F) |
| CT | Current transformer |
| K1M | Magnetic contactor compressor |
| X1M | Terminal strip power supply |
| X2M | Terminal strip interconnection wiring |

1

## 4.4 RR/RQ125B7W1B

**Switch box**

The illustration below shows the switch box layout.




**Components**

The table below contains the components of the switch box.

| Symbol | Component |
|---|---|
| PCB | Printed Circuit Board |
| C1 | Fan motor capacitor (M1F) |
| C2 | Compressor capacitor (M2F) |
| CT | Current transformer |
| K1M | Magnetic contactor compressor |
| X1M | Terminal strip power supply |
| X2M | Terminal strip interconnection wiring |

# 5 Wiring Diagrams: Outdoor Units

## 5.1 What Is in This Chapter?

**Introduction**

This chapter contains the wiring diagrams of the outdoor units.

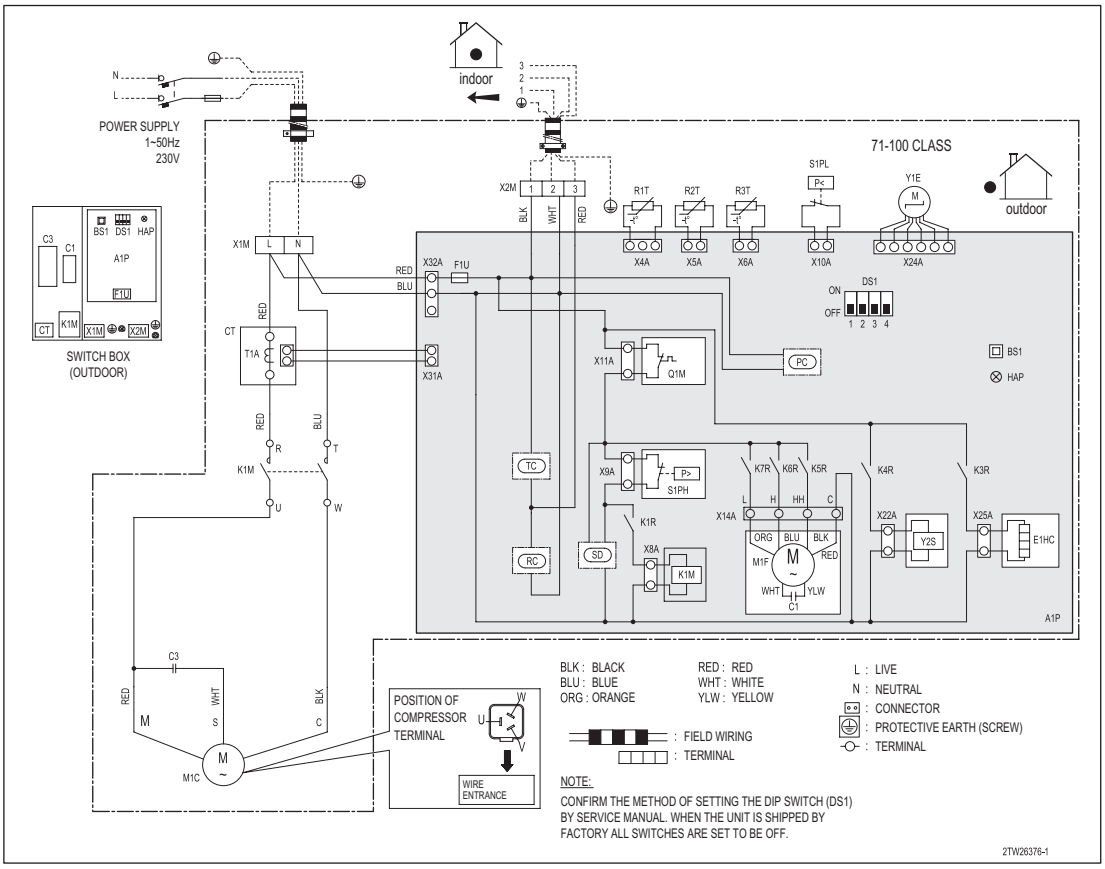
**Wiring diagrams**

This chapter contains the following wiring diagrams:

1

## 5.2 RR71-100B7V3B

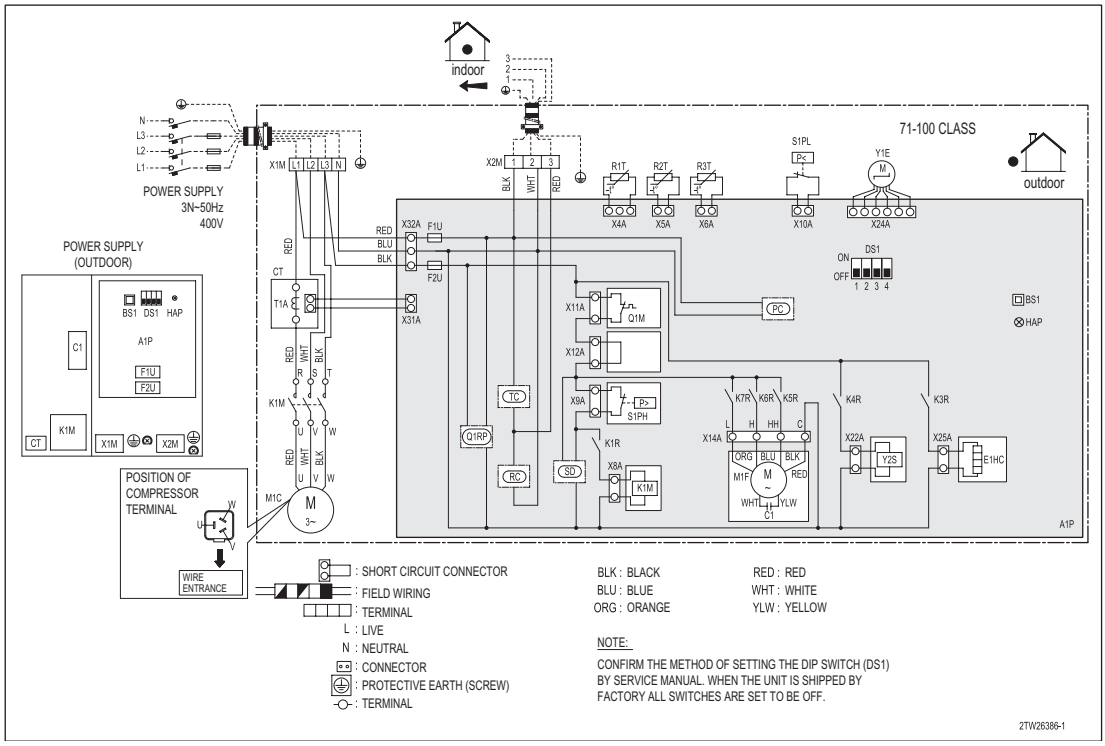
**Wiring diagram** The illustration below shows the wiring diagram of the unit.




| | | | |
|---|---|---|---|
| A1P | Printed circuit board | M1F | Motor fan |
| BS1 | Push button switch (Forced defrost-pump down) | PC | Power circuit |
| | | Q1M | Thermo switch (M1F) |
| C1 | Capacitor (M1F) | R1T | Thermistor (Air) |
| C3 | Capacitor (M1C) | R2T | Thermistor (Coil) |
| DS1 | Dip switch | R3T | Thermistor (Discharge pipe) |
| E1HC | Crankcase heater | RC | Signal receiver circuit |
| F1U | Fuse (T6.3/250V) | S1PH | Pressure switch (High) |
| HAP | Light emitting diode (Service monitor green) | S1PL | Pressure switch (Low) |
| | | SD | Safety devices input |
| K1M | Magnetic contactor (M1C) | T1A | Current transformer |
| K1R | Magnetic relay (K1M) | TC | Signal transmission circuit |
| K3R | Magnetic relay (E1HC) | X1M, X2M | Terminal strip |
| K4R | Magnetic relay (Y2S) | Y1E | Expansion valve (Electronic) |
| K5R, K6R, K7R | Magnetic relay (M1F) | Y2S | Solenoid valve |
| M1C | Motor compressor | CT | Current transformer |

## 5.3 RR71-100B7W1B

**Wiring diagram** The illustration below shows the wiring diagram of the unit.

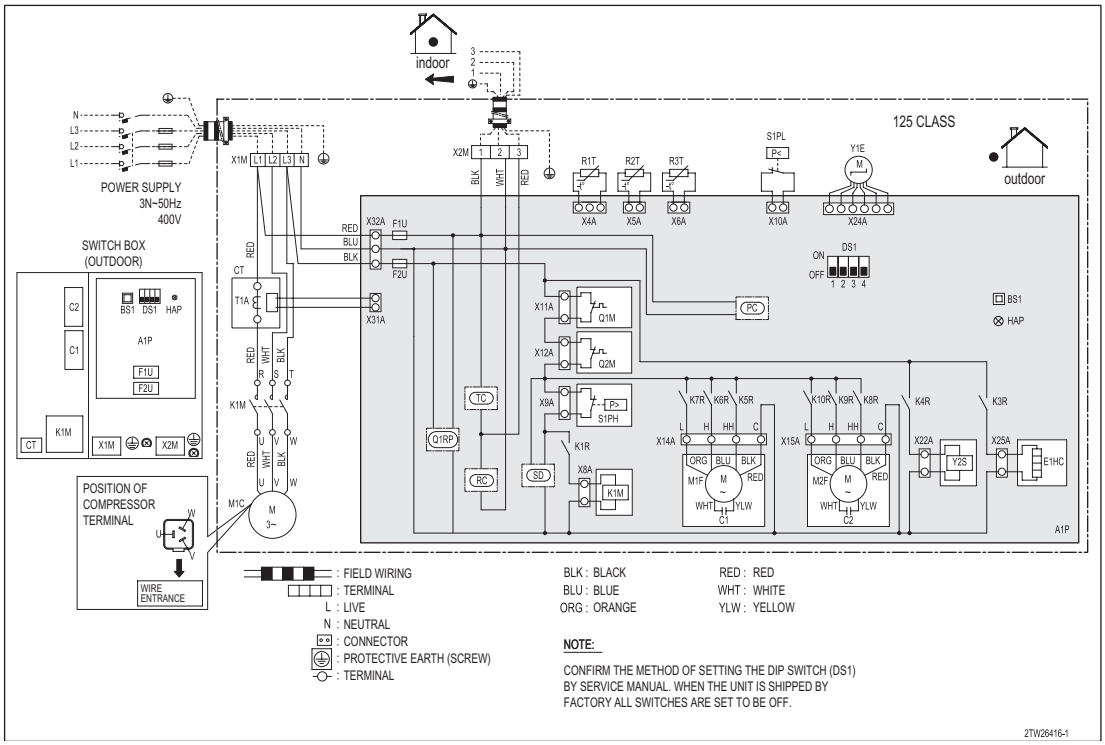



| | | | |
|---|---|---|---|
| A1P | Printed circuit board | PC | Power circuit |
| BS1 | Push button switch (Forced defrost-pump down) | Q1M | Thermo switch (M1F) |
| | | Q1RP | Phase reverse circuit |
| C1 | Capacitor (M1F) | R1T | Thermistor (Air) |
| DS1 | Dip switch | R2T | Thermistor (Coil) |
| E1HC | Crankcase heater | R3T | Thermistor (Discharge pipe) |
| F1U, F2U | Fuse (T6.3/250V) | RC | Signal receiver circuit |
| HAP | Light emitting diode (Service monitor green) | S1PH | Pressure switch (High) |
| | | S1PL | Pressure switch (Low) |
| K1M | Magnetic contactor (M1C) | SD | Safety devices input |
| K1R | Magnetic relay (K1M) | T1A | Current transformer |
| K3R | Magnetic relay (E1HC) | TC | Signal transmission circuit |
| K4R | Magnetic relay (Y2S) | X1M, X2M | Terminal strip |
| K5R, K6R, K7R | Magnetic relay (M1F) | Y1E | Expansion valve (Electronic) |
| M1C | Motor compressor | Y2S | Solenoid valve |
| M1F | Motor fan | CT | Current transformer |

1

## 5.4 RR125B7W1B

**Wiring diagram** The illustration below shows the wiring diagram of the unit.

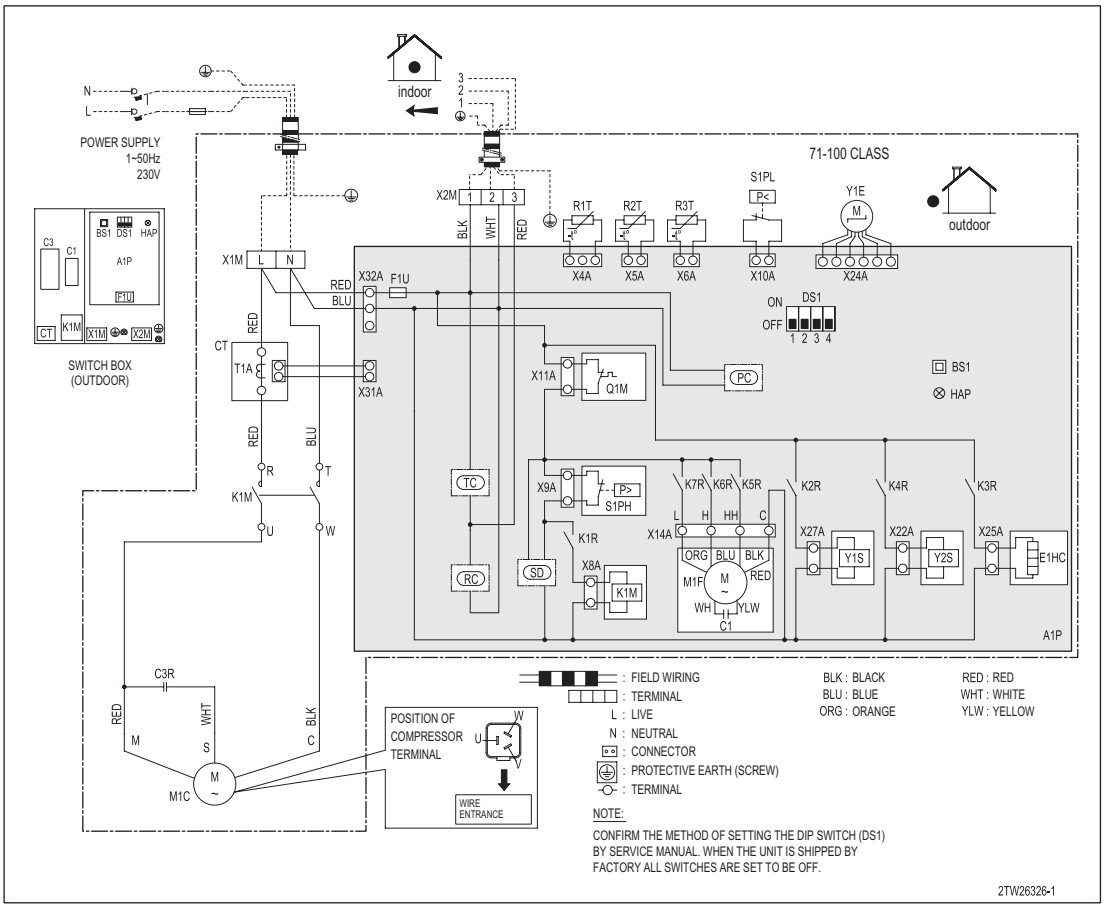



| | | | |
|---|---|---|---|
| A1P | Printed circuit board | PC | Power circuit |
| BS1 | Push button switch (Forced defrost-pump down) | Q1M | Thermo switch (M1F) |
| | | Q2M | Thermo switch (M2F) |
| C1 | Capacitor (M1F) | Q1RP | Phase reverse circuit |
| C2 | Capacitor (M2F) | R1T | Thermistor (Air) |
| DS1 | Dip switch | R2T | Thermistor (Coil) |
| E1HC | Crankcase heater | R3T | Thermistor (Discharge pipe) |
| F1U, F2U | Fuse (T6.3/250V) | RC | Signal receiver circuit |
| HAP | Light emitting diode (Service monitor green) | S1PH | Pressure switch (High) |
| | | S1PL | Pressure switch (Low) |
| K1M | Magnetic contactor (M1C) | SD | Safety devices input |
| K1R | Magnetic relay (K1M) | T1A | Current transformer |
| K3R | Magnetic relay (E1HC) | TC | Signal transmission circuit |
| K4R | Magnetic relay (Y2S) | X1M, X2M | Terminal strip |
| K5R, K6R, K7R | Magnetic relay (M1F) | Y1E | Expansion valve (Electronic) |
| K8R, K9R, K10R | Magnetic relay (M2F) | Y2S | Solenoid valve |
| M1C | Motor compressor | CT | Current transformer |
| M1F, M2F | Motor fan | | |

## 5.5 RQ71-100B7V3B



**Wiring diagram** The illustration below shows the wiring diagram of the unit.

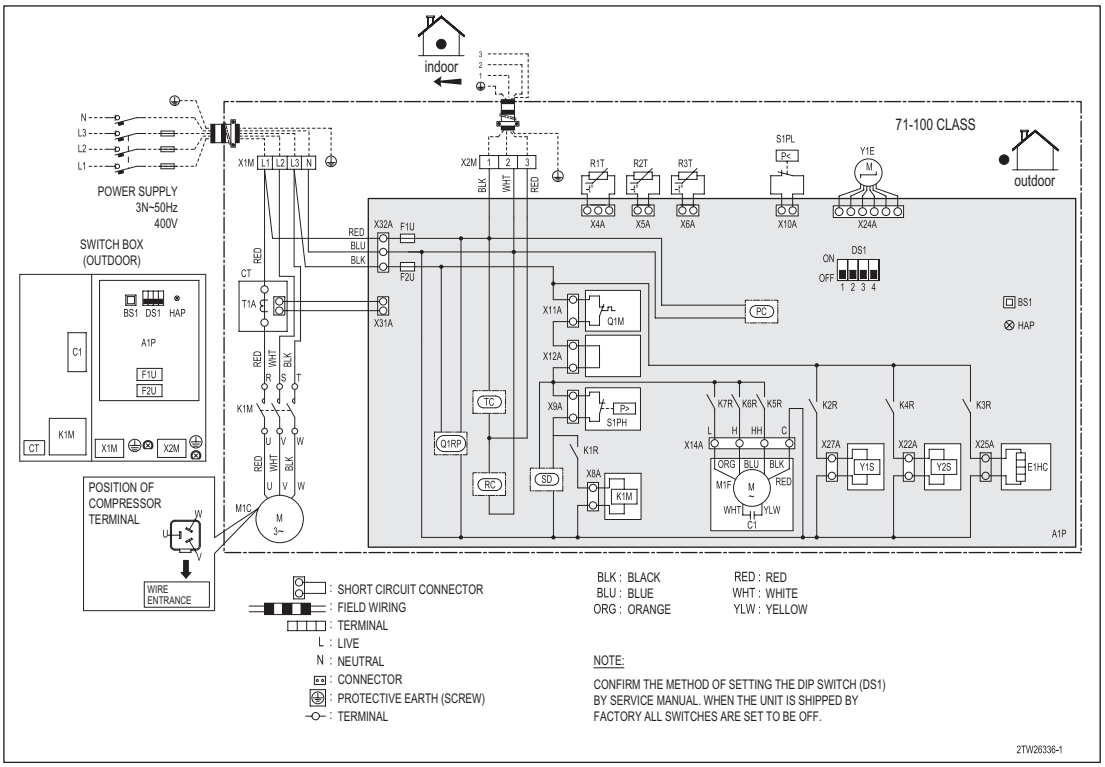



| | | | |
|---|---|---|---|
| A1P | Printed circuit board | M1F | Motor fan |
| BS1 | Push button switch (Forced defrost-pump down) | PC | Power circuit |
| | | Q1M | Thermo switch (M1F) |
| C1 | Capacitor (M1F) | R1T | Thermistor (Air) |
| C3 | Capacitor (M1C) | R2T | Thermistor (Coil) |
| DS1 | Dip switch | R3T | Thermistor (Discharge pipe) |
| E1HC | Crankcase heater | RC | Signal receiver circuit |
| F1U | Fuse (T6.3/250V) | S1PH | Pressure switch (High) |
| HAP | Light emitting diode (Service monitor green) | S1PL | Pressure switch (Low) |
| | | SD | Safety devices input |
| K1M | Magnetic contactor (M1C) | T1A | Current transformer |
| K1R | Magnetic relay (K1M) | TC | Signal transmission circuit |
| K2R | Magnetic relay (Y1S) | X1M, X2M | Terminal strip |
| K3R | Magnetic relay (E1HC) | Y1E | Expansion valve (Electronic) |
| K4R | Magnetic relay (Y2S) | Y1S | 4-way valve |
| K5R, K6R, K7R | Magnetic relay (M1F) | Y2S | Solenoid valve |
| M1C | Motor compressor | CT | Current transformer |

1

## 5.6 RQ71-100B7W1B

**Wiring diagram** The illustration below shows the wiring diagram of the unit.

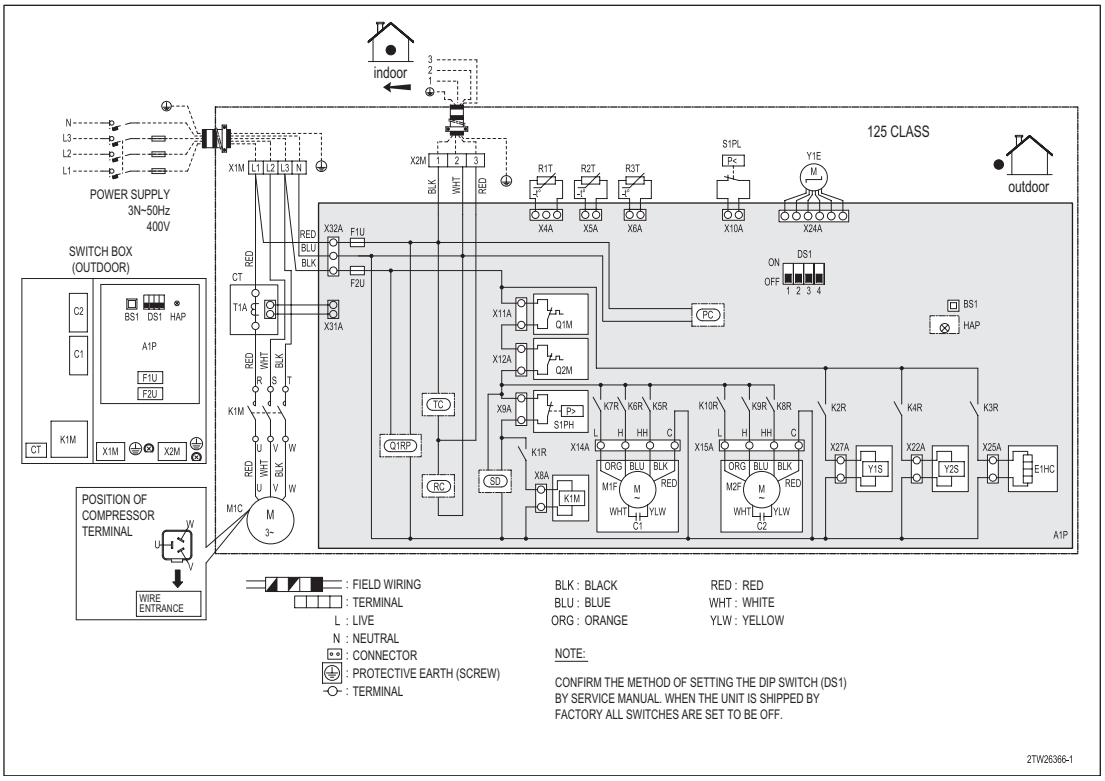



| | | | |
|---|---|---|---|
| A1P | Printed circuit board | PC | Power circuit |
| BS1 | Push button switch (Forced defrost-pump down) | Q1M | Thermo switch (M1F) |
| | | Q1RP | Phase reverse circuit |
| C1 | Capacitor (M1F) | R1T | Thermistor (Air) |
| DS1 | Dip switch | R2T | Thermistor (Coil) |
| E1HC | Crankcase heater | R3T | Thermistor (Discharge pipe) |
| F1U, F2U | Fuse (T6.3/250V) | RC | Signal receiver circuit |
| HAP | Light emitting diode (Service monitor green) | S1PH | Pressure switch (High) |
| | | S1PL | Pressure switch (Low) |
| K1M | Magnetic contactor (M1C) | SD | Safety devices input |
| K1R | Magnetic relay (K1M) | T1A | Current transformer |
| K2R | Magnetic relay (Y1S) | TC | Signal transmission circuit |
| K3R | Magnetic relay (E1HC) | X1M, X2M | Terminal strip |
| K4R | Magnetic relay (Y2S) | Y1E | Expansion valve (Electronic) |
| K5R, K6R, K7R | Magnetic relay (M1F) | Y1S | 4-way valve |
| M1C | Motor compressor | Y2S | Solenoid valve |
| M1F | Motor fan | CT | Current transformer |

## 5.7 RQ125B7W1B



**Wiring diagram** The illustration below shows the wiring diagram of the unit.




| | | | |
|---|---|---|---|
| A1P | Printed circuit board | PC | Power circuit |
| BS1 | Push button switch (Forced defrost-pump down) | Q1M | Thermo switch (M1F) |
| | | Q2M | Thermo switch (M2F) |
| C1 | Capacitor (M1F) | Q1RP | Phase reverse circuit |
| C2 | Capacitor (M2F) | R1T | Thermistor (Air) |
| DS1 | Dip switch | R2T | Thermistor (Coil) |
| E1HC | Crankcase heater | R3T | Thermistor (Discharge pipe) |
| F1U, F2U | Fuse (T6.3/250V) | RC | Signal receiver circuit |
| HAP | Light emitting diode (Service monitor green) | S1PH | Pressure switch (High) |
| | | S1PL | Pressure switch (Low) |
| K1M | Magnetic contactor (M1C) | SD | Safety devices input |
| K1R | Magnetic relay (K1M) | T1A | Current transformer |
| K2R | Magnetic relay (Y1S) | TC | Signal transmission circuit |
| K3R | Magnetic relay (E1HC) | X1M, X2M | Terminal strip |
| K4R | Magnetic relay (Y2S) | Y1E | Expansion valve (Electronic) |
| K5R, K6R, K7R | Magnetic relay (M1F) | Y1S | 4-way valve |
| K8R, K9R, K10R | Magnetic relay (M2F) | Y2S | Solenoid valve |
| M1C | Motor compressor | CT | Current transformer |
| M1F, M2F | Motor fan | | |

1

# 6 PCB Layout

## 6.1 What Is in This Chapter?

**Introduction**

This chapter contains the following information:

- ➤ It describes which unit uses which PCB types
- ➤ It shows the PCB connectors.

**PCB layouts**

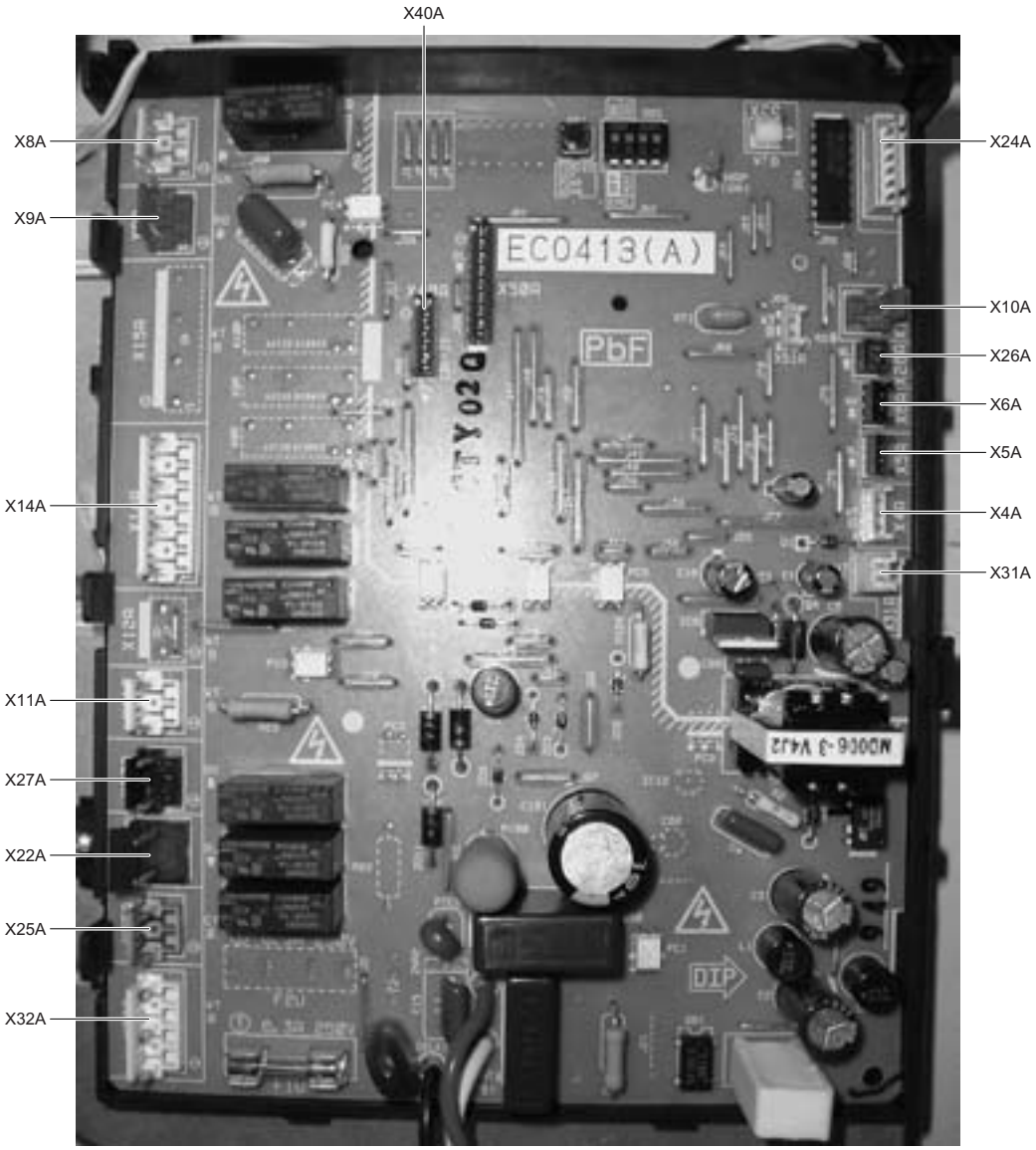
This chapter contains the following PCB layouts:

1

## 6.2 RR/RQ71-100B7V3B (EC0413)

**PCB**

The illustration below shows the PCB connectors.



**Connectors**

The table below describes the PCB connectors.

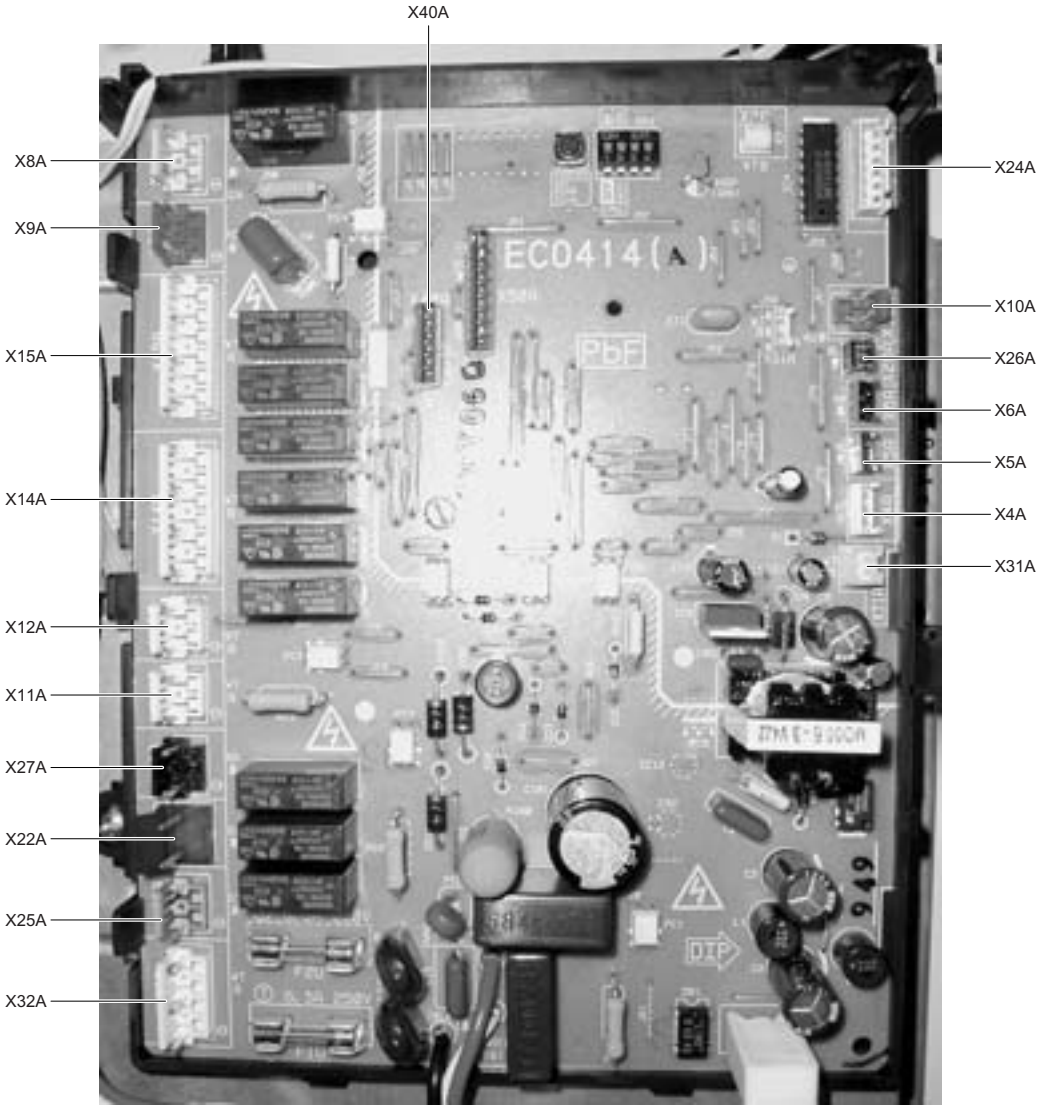
| Connector | Connected to | Description |
|---|---|---|
| X4A | R1T | Thermistor (air) |
| X5A | R2T | Thermistor (coil) |
| X6A | R3T | Thermistor (discharge pipe) |
| X8A | K1M | Magnetic contactor (M1C) |
| X9A | S1PH | Pressure switch (high) |
| X10A | S1PL | Pressure switch (low) |
| X11A | Q1M | Thermo switch (M1F) |
| X14A | M1F | Fan motor |
| X22A | Y2S | Solenoid valve |
| X24A | Y1E | Electronic expansion valves |
| X25A | E1HC | Crankcase heater |
| X26A | — | Connector for capacity setting adaptor |
| X27A | Y1S | 4-way valve (Not used for cooling only units) |
| X31A | T1A | Current transformer |
| X32A | X1M | Terminal strip |
| X40A | — | Connector for service checker |

1

## 6.3 RR/RQ71~125B7W1B (EC0414)

**PCB**

The illustration below shows the PCB connectors.



**Connectors**

The table below describes the PCB connectors.

| Connector | Connected to | Description |
|---|---|---|
| X4A | R1T | Thermistor (air) |
| X5A | R2T | Thermistor (coil) |
| X6A | R3T | Thermistor (discharge pipe) |
| X8A | K1M | Magnetic contactor (M1C) |
| X9A | S1PH | Pressure switch (high) |
| X10A | S1PL | Pressure switch (low) |
| X11A | Q1M | Thermo switch (M1F) |
| X12A | Q2M | Thermo switch (M2F), only for 125 class |
| X14A | M1F | Fan motor 1 |
| X15A | M2F | Fan motor 2, only for 125 class |
| X22A | Y2S | Solenoid valve |
| X24A | Y1E | Electronic expansion valves |
| X25A | E1HC | Crankcase heater |
| X26A | — | Connector for capacity setting adaptor |
| X27A | Y1S | 4-way valve (Not used for cooling only units) |
| X31A | T1A | Current transformer |
| X32A | X1M | Terminal strip |
| X40A | — | Connector for service checker |

# Part 2
# Functional Description



**What is in this part?** This part contains the following chapters:

2

# 1 General Functionality



## 1.1 What Is in This Chapter?

**Introduction**

This chapter contains information on the functions used to control the system. Understanding these functions is vital when diagnosing a malfunction that is related to the functional control.

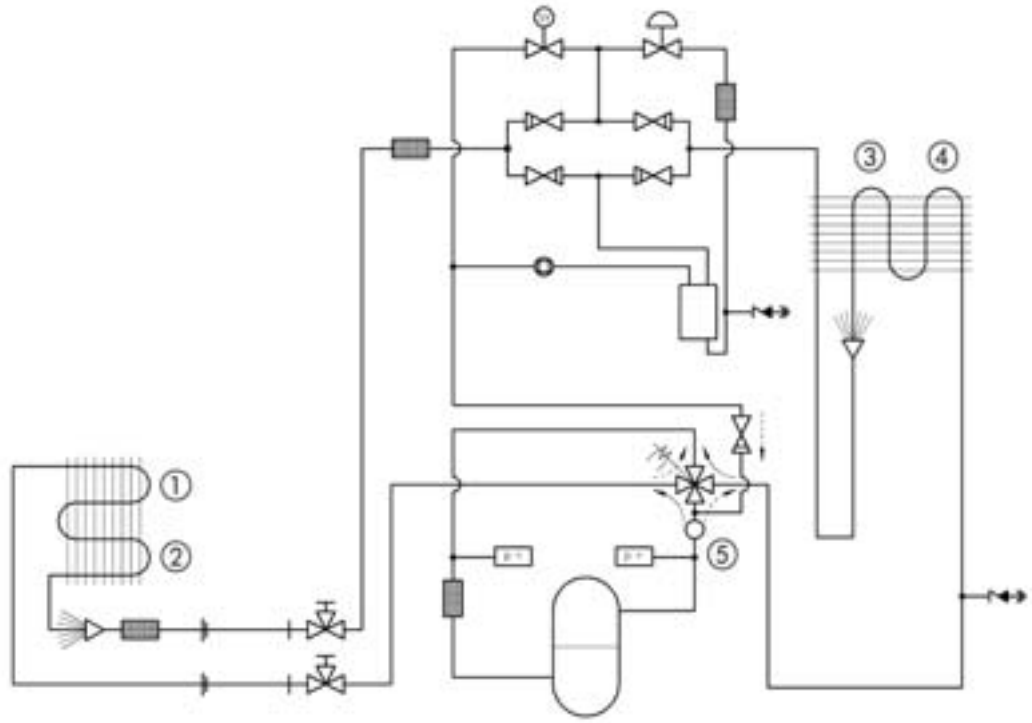
**Overview**

This chapter contains the following topics:

## 1.2 Functions of Thermistors

**Locating the thermistors**

The thermistors on the illustration below are used to control the system. This control secures a proper operation and prevents problems of the unit.




**Functions of the thermistors**

The table below contains the thermistor functions of the heat pump unit.

| Ther-mistor | Location | Wiring symbol | Mode | Function |
|---|---|---|---|---|
| 1 | Indoor heat exchanger | R2T | Cooling | ➤ Optimise discharge temp. (evap. temp.)<br>➤ Freeze-up thermostat |
| | | | Heating | ➤ Optimise discharge temp. (cond. temp.)<br>➤ Integral capacity calculation (to determine defrost)<br>➤ Hot start indoor fan<br>➤ Peak cut-off<br>➤ Outdoor unit fan control |

| Ther-mistor | Location | Wiring symbol | Mode | Function |
|---|---|---|---|---|
| 2 | Indoor air return | R1T | Cooling | ➤ Thermostat control<br>➤ Start-up control expansion valve and outdoor unit fan<br>➤ Outdoor fan speed control |
| | | | Heating | ➤ Thermostat control<br>➤ Start-up control expansion valve and outdoor unit fan<br>➤ Integral capacity calculation (to determine defrost)<br>➤ Peak cut-off |
| 3 | Outdoor heat exchanger | R2T | Cooling | ➤ Optimise discharge temp. (cond. temp.)<br>➤ Outdoor fan speed control (O.L.) |
| | | | Heating | ➤ Optimise discharge temp. (evap. temp.)<br>➤ Defrost start/stop |
| 4 | Outdoor air return | R1T | Cooling | ➤ Outdoor fan speed control<br>➤ Start-up control expansion valve and outdoor unit fan |
| | | | Heating | ➤ Integral capacity calculation (to determine defrost)<br>➤ Start-up control expansion valve and outdoor unit fan |
| 5 | Discharge pipe com-pressor | R3T | Cooling | ➤ Cooling overload<br>➤ Check refrigerant shortage/too much refrigerant<br>➤ Expansion valve control |
| | | | Heating | ➤ Heating overload<br>➤ Check refrigerant shortage/too much refrigerant<br>➤ Expansion valve control |

## 1.3 Operating Modes and Control Modes

**Operating modes**

The two operating modes are:

- ➤ Normal operating mode
- ➤ Forced operating mode.

2

**Control modes**

The table below contains the different control modes of the Sky Air R410A B-series air conditioners.

| Operating mode | Control mode |
|---|---|
| Normal operating mode | Cooling |
| | Dry keep |
| | Heating |
| | Defrosting (automatic) |
| | Freeze-up |
| | Pump down |
| | Stop mode |
| Forced operating mode | Forced cooling |
| | Forced heating |
| | Forced defrosting |

## 1.4 Forced Operating Mode (Emergency Operation)

**Applicable units**

The forced operating mode is applicable for the following units:

| Model type | For this unit, you can go to... |
|---|---|
| RR71~125B | Forced cooling mode |
| RQ71~125B | ➤ Forced cooling mode<br>➤ Forced heating mode |

**Purpose**

The table below describes the purpose of the forced operating mode.

| If... | Then... |
|---|---|
| ➤ Remocon is malfunctioning, or<br>➤ Indoor PCB is off line, or<br>➤ Outdoor PCB is off line | Forced operating mode can be used to go to cooling or heating. In forced operating mode, the compressor is forced to operate until the malfunctioning indoor or outdoor PCB is back online. |

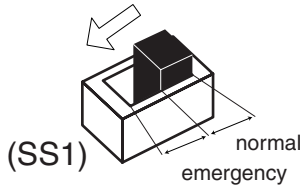
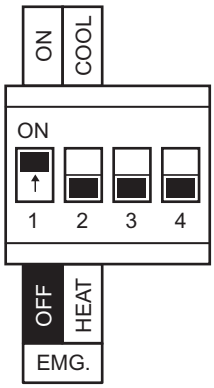
**Before switching**

Before moving the switches to emergency operation, make sure to turn OFF the power firstly.

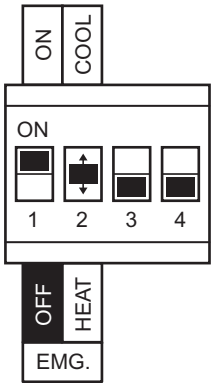
During emergency operation, do not attempt to operate the equipment from the remote controller. The remote controller displays 88 while the emergency operation is active on the indoor unit.

**Switching**

To switch to forced operating mode, proceed as follows:

| Step | Action |
|---|---|
| 1 | Turn OFF the power. |
| 2 | Switch ON the emergency switch (SS1) on the indoor PCB.<br>  |
| 3 | Switch ON the emergency switch on DS1 on the outdoor PCB.<br>  <br>Switch 2 is not applicable for the c/o units. |

2

| Step | Action |
|---|---|
| 4 | Switch the emergency switch on DS1 on the outdoor PCB to the forced mode you prefer.<br>  <br><br>Switch 2 is not applicable for the c/o units. |
| 5 | Turn ON the power. |

**Before switching back**

Before moving the switches back to normal operating mode, make sure to turn OFF the power firstly.

**Starting conditions**

You can operate the system manually by changing the emergency switch on the indoor and outdoor PCB from “normal” to “emergency”. However, when in emergency operation, the equipment cannot control the temperature.

Make sure to set both indoor and outdoor unit to emergency.

**Ending conditions**

You can end the emergency operation by changing the emergency switch back to “normal” while the power is OFF.

**Emergency operation**

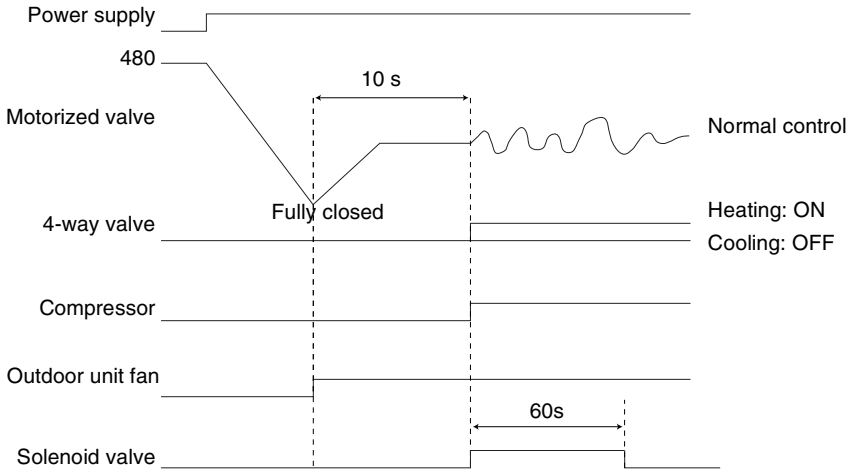
The table below describes what happens when you change the emergency switch to “emergency”.

| Changing the emergency switch to “emergency” for the... | Switches ON... |
|---|---|
| Indoor unit | ➤ Indoor fan<br>➤ Drain pump |
| Outdoor unit | ➤ Compressor<br>➤ Outdoor fan(s) |

**Time chart**

The time chart below illustrates emergency operation.

- ➤ In cooling, the unit runs for 20 min and then stops for 10 min in order to avoid freeze-up of the indoor coil.
- ➤ During emergency operation, do not attempt to operate the equipment from the remote controller. The remote controller shows 88 while the emergency operation is active on the indoor unit.




**Active components**

The table below shows when the most important components are active in the different forced operating modes.

| Component | Forced cooling | Forced heating | Forced defrosting |
|---|---|---|---|
| Compressor | ON | ON | ON |
| 4-way valve | RQ71~125B: OFF | RQ71~125B: ON | RQ71~125B: OFF |
| Outdoor unit fan | H fan speed | H fan speed | OFF |
| Indoor unit fan | H fan speed | H fan speed | H fan speed |
| Drain pump | ON | OFF | ON |

**Additional info**

To avoid misunderstandings, take the following into account:

- ➤ If the PCB or the motorized valve is malfunctioning, emergency operation cannot be carried out.
- ➤ No signal is transmitted between the indoor and outdoor units and remocon. “88” is displayed on the remote controller.
- ➤ If a safety device should be activated during emergency operation, all actuators are turned OFF.
- ➤ “Heat” cannot be set for c/o air conditioners.
- ➤ Emergency operation uses (and switches ON) both indoor and outdoor control PCBs. The outdoor control PCB determines the changeover.
- ➤ In heating, defrosting is activated once every hour.

## 1.5 Outdoor Unit Identification Function

**Applicable units**

The outdoor unit identification function is applicable for the following units:

| Model type | Model name |
|---|---|
| Cassette | FFQ, FCQ, FUQ |
| Ceiling | FHQ |
| Wall | FAQ |
| Duct | FBQ, FDQ |

**Purpose**

The purpose of the outdoor unit identification function is to enable the indoor unit to automatically determine which operating mode has to be set in function of the outdoor unit type (c/o or h/p).

**Operating modes**

The possible operating modes are:

| Outdoor unit | Operating modes |
|---|---|
| h/p | ➤ Fan<br>➤ Cooling<br>➤ Dry keep<br>➤ Heating |
| c/o | ➤ Fan<br>➤ Cooling<br>➤ Dry keep |

**Used input**

The outdoor unit identification function uses the following inputs:

| Input | Connection on indoor PCB | Connection on outdoor PCB |
|---|---|---|
| Indoor PCB | TC & RC | — |
| Outdoor PCB | — | TC &RC |

TC: Transmission circuit
RC: Receiving circuit

## 1.6 Thermostat Control

**Applicable units**

All units

**Purpose**

The purpose of thermostat control is to control the compressor operation, by sensing the indoor return air temperature.

**Preventing thermostat OFF conditions**

The thermostat control prevents the thermostat from turning OFF in the following conditions:

- ➤ Initial operation for the first 2.5 min, or
- ➤ Defrosting, or
- ➤ Forced operating mode.

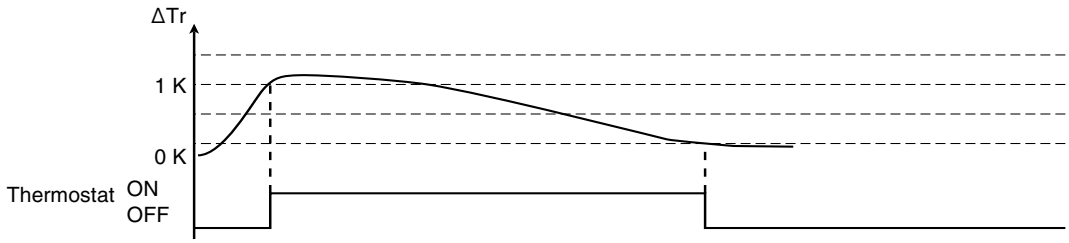
**ΔTr**

The table below shows how to calculate ΔTr.

| In... | ΔTr = | Remark |
|---|---|---|
| Cooling | Tr - Ts | ➤ Tr = indoor unit return air temp.<br>➤ Ts = temp. set by the remote controller |
| Heating | Ts - Tr | |

**Time chart**

The time chart below illustrates the thermostat control.




**Thermostat**

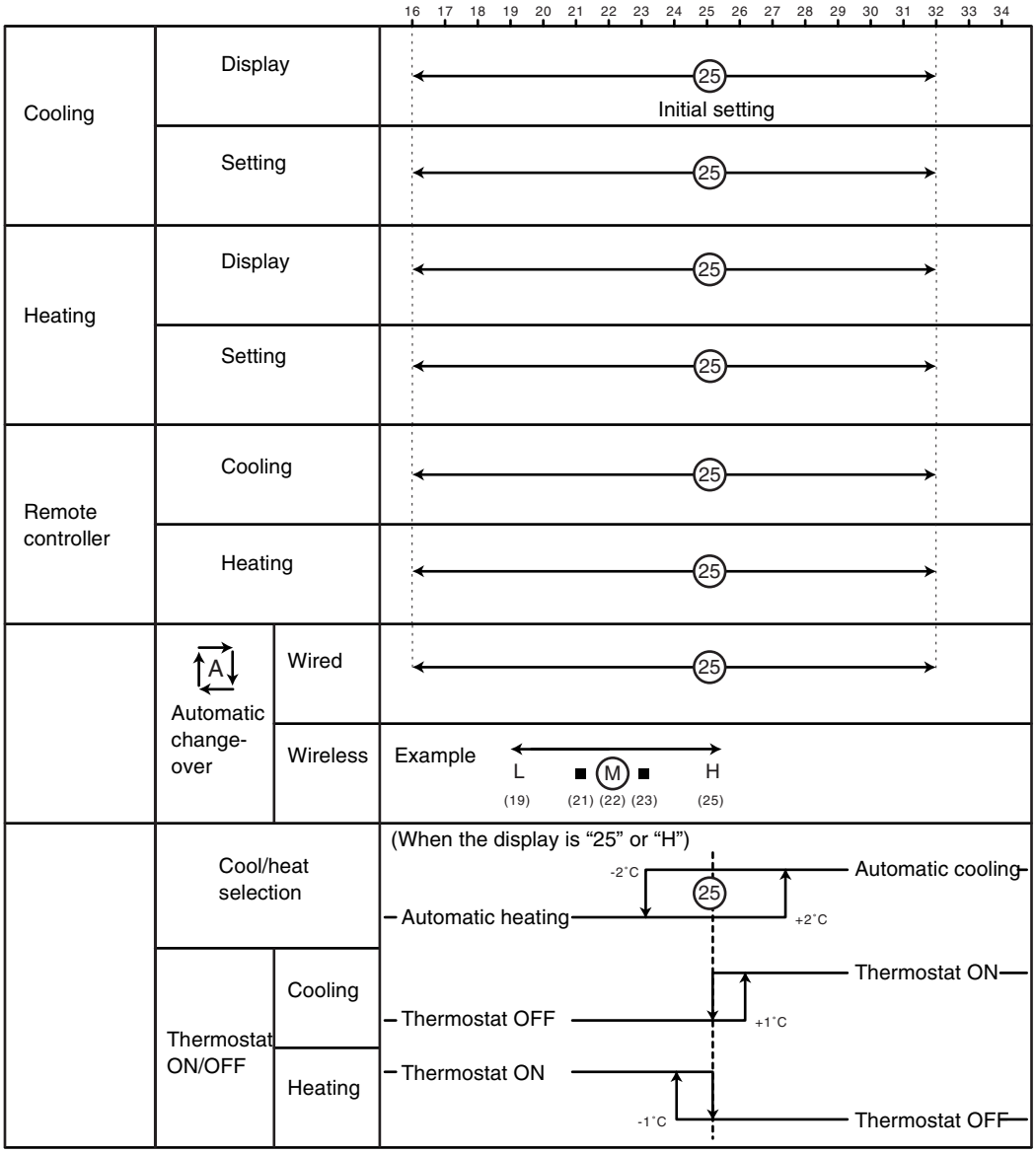
The table below describes when the thermostat turns ON and OFF.

| When... | Then the thermostat turns... |
|---|---|
| ➤ ΔTr ≥ 1 K AND<br>➤ Guard timer of the compressor has counted down (3 min) | ON |
| ➤ ΔTr ≤ 0 K AND<br>➤ Thermostat is ON for min. 2 min | OFF |

2

**Preset temp. range**

The table below illustrates the preset temperature range.



## 1.7 Forced Thermostat OFF

**Applicable units**

All indoor units

**Purpose**

The outdoor unit independently turns its thermostat OFF by means of control other than thermostat OFF commands from the indoor unit.

**Method**

The table below contains the different conditions for which the thermostat is turned OFF by the outdoor unit.

| Thermostat OFF control | Indicator | Starting conditions | Result | Reset |
|---|---|---|---|---|
| Freeze-up function: See page 2–29. | | | | |
| Cooling overload | Outdoor heat exchanger temperature Tc | Tc > A°C for 90 s continuously<br>(min. B - max. C°C for practice function) | The thermostat is turned OFF.<br>Next start, initial opening E.V.:<br>+ 70 pulses (cooling)<br>+ 80 pulses (heating) | Remocon OFF |
| Heating overload (peak cut-off) | Indoor heat exchanger temperature Tc | Tc > 60°C for 90 s continuously (min. 57 - max. 63°C for practice function) | | |
| Discharge pipe high temperature | Discharge pipe temperature T2 | Td > 120°C for 20 s continuously | | |
| Td disconnection | Discharge pipe thermistor T2 | Td is determined to be disconnected from the piping 5 min after the compressor starts.<br>Td < 55°C<br>Td < Ta + 10°C<br>$\Delta$Td ≤ 5 K within 5 min after start | Retry 6 x until final error “F3” | |

**Parameters**

| | 71 | 100 | 125 |
|---|---|---|---|
| A | 58 °C | 57 °C | 59 °C |
| B | 53 °C | 52 °C | 54 °C |
| C | 61 °C | 60 °C | 62 °C |

**Remarks**

- In case of O.L. operation, O.L. will be activated +1K next time.
- In case of H.P. activation, O.L. will be activated -1K next time.

**Used input**

The forced thermostat OFF control uses the following inputs:

| Input | Connection on indoor PCB | Connection on outdoor PCB |
|---|---|---|
| Outdoor heat exchanger thermistor | — | R2T |
| Indoor heat exchanger thermistor | R2T | — |
| Discharge pipe thermistor | — | R3T |

**Remark**

➤ In case of twin/triple applications the highest Tc is used.

## 1.8 HPS and LPS Function

**Applicable units**

RR/RQ71~125B

**Purpose**

**HPS (High-Pressure Switch)**

If the pressure at the discharge side of the compressor becomes abnormally high, the HPS stops the unit automatically in order to prevent it from breaking down.

**LPS (Low-Pressure Switch)**

If the pressure at the suction side of the compressor becomes abnormally low, the LPS stops the unit automatically in order to prevent it from breaking down.

**Method**

The table below describes what happens in case of HPS or LPS activation.

| If the... is activated | Then... | Remark |
|---|---|---|
| HPS | The compressor stops and stands by for 3 min. | If this is activated an additional 6 times from the first detection and before it is turned OFF by the remote controller, the operation stops due to malfunction. 20 sec's are added after each restart. |
| LPS | The compressor stops and stands by for 3 min.<br>However, depending on the operating conditions, the compressor may not turn OFF (LPS marking). | |

**Used input**

The HPS and LPS detection function uses the following inputs:

| Input | Connection on indoor PCB | Connection on outdoor PCB |
|---|---|---|
| High-pressure switch | — | X9A |
| Low-pressure switch | — | X10A |

## 1.9 Simulated Operation Function

**Applicable units**

RR/RQ71~125B

**Purpose**

The purpose of the simulated operation function is to avoid the unit from stopping if the heat exchanger thermistor or air thermistor is malfunctioning.

**Method**

If the air thermistor (for all models listed) or the heat exchanger thermistor is malfunctioning (out of its normal range), simulated operation is carried out while malfunction is displayed on the remote controller. If the air or heat exchanger thermistor becomes normal again, the simulated operation function is interrupted and the normal operation restarts. The malfunctioning error disappears.

**Used input**

The simulated operation function uses the following inputs:

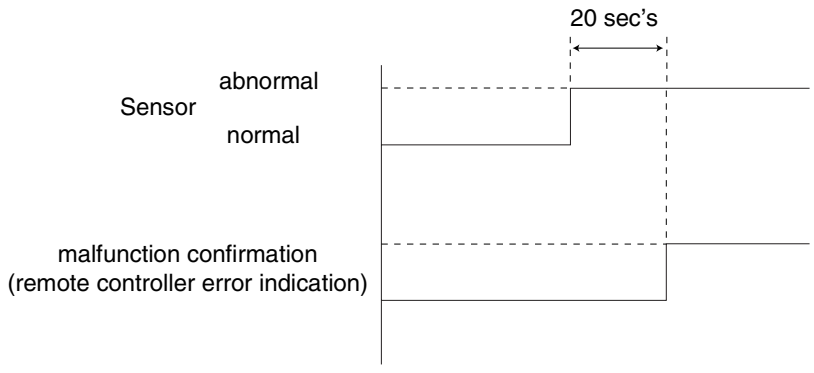
| Input | Connection on indoor PCB | Connection on outdoor PCB |
|---|---|---|
| Outdoor air thermistor | — | R1T-X4A |
| Outdoor heat exchanger thermistor | — | R2T-X5A |
| Indoor air thermistor | R1T-X19A | — |
| Indoor heat exchanger thermistor | R2T-X18A | — |
| Discharge pipe thermistor | — | R3T-X6A |

**Parameters**

➤ Check sensor value every 500 msec's.

➤ Abnormal values are sensor values out of below range :

| Sensor | Lower than… | Higher than… |
|---|---|---|
| Indoor coil and air sensor | -23°C | 120°C |
| Outdoor coil and air sensor | -40°C | 127°C |
| Discharge pipe sensor | -12°C | 165°C |



## 1.10 Discharge Pipe Temperature Control

**Applicable units**

RR/RQ71~125B

**Purpose**

The purpose of the discharge pipe temperature control is to prevent a discharge pipe temperature that is too high or too low.



**Low temp. starting conditions**

The table below contains the low temperature conditions to start the discharge pipe temperature control.

| Function | Description | Starting conditions | F3-error occurs if the conditions... |
|---|---|---|---|
| Wet operation | Prevents liquid suction to the compressor. | ➤ Change in E.V. opening < 50 pulses<br>➤ Td < Tc + 10°C | Are met for 15 min continuously. |
| Thermistor out | Detects if the discharge thermistor is not in the correct position. | ➤ Td < 55°C<br>➤ After start-up + 5 min:<br>- $\Delta$Td ≤ 5 K<br>- Td < Ta + 10°C | Are repeated 6 times. |

**High temp. starting conditions**

The table below contains the high temperature conditions to start the discharge pipe temperature control.

| Function / description | Starting conditions | F3-error occurs if the conditions... |
|---|---|---|
| Detects too high discharge gas temperatures. | Td ≥ 120°C for 20 s continuously | Are repeated 6 times. |

**Used input**

The discharge pipe temperature control uses the following inputs:

| Input | Connection on indoor PCB | Connection on outdoor PCB |
|---|---|---|
| Outdoor discharge thermistor | — | R3T-X6A |
| Outdoor heat exchanger thermistor | — | R2T-X5A |
| Indoor heat exchanger thermistor | R2T-X18A | — |

## 1.11 Gas Shortage Function

**Purpose**

The purpose of the gas shortage function is to detect refrigerant shortage before the unit stops due to a discharge temperature that is too high.

2

**Method**

When the thermostat is turned OFF due to a discharge pipe temperature that is too high and the E.V. opening is 450 pulses or more, the gas shortage error is activated. However, operation does not stop due to gas shortage.

To check the gas shortage error (UD), see page 3–62.

**Used input**

The gas shortage function uses the following inputs:

| Input | Connection on indoor PCB | Connection on outdoor PCB |
|---|---|---|
| Outdoor discharge thermistor | — | R3T-X6A |
| Outdoor expansion valve | — | Y1E-X24A |

## 1.12 Drain Pump Control

**Applicable units**

The drain pump control is applicable for the following units:

| Model type | Model name |
|---|---|
| Cassette | FCQ (standard) and FUQ (standard) |
| Duct | FBQ (standard) |
| Ceiling | FHQ (optional) |

**Purpose**

The purpose of the drain pump control is to control the water draining from the drain pan.

**Starting conditions**

The drain pump control starts the drain pump when one of the following conditions is fulfilled:

- ➤ The cooling operation is activated, or
- ➤ The level in the drain pan becomes abnormally high, or
- ➤ Freeze-up prevention is detected in cooling operation.

**Method**

The float switch opens because an abnormal drain level is detected in the drain pan.

The table below describes the activation at open float switch.

| Situation | Activation at open float switch |
|---|---|
| Thermostat ON | 1. The thermostat is immediately turned OFF.<br>2. The drain pump continues to operate for minimum 10 min.<br>3. If the float switch closes again within 80 s, cooling can restart after the 10 min recovery. |
| Thermostat OFF | 1. The thermostat stays forced OFF.<br>2. The drain pump starts to operate for minimum 10 min.<br>3. If the float switch closes again within 80 s, cooling can restart after the 10 min recovery. |
| Float switch opens each time the drain pump stops. | After five retrials the error code " RF " flashes on the remote controller. |

**Used input**

The drain pump control uses the following inputs:

| Input | Connection on indoor PCB | Connection on outdoor PCB |
|---|---|---|
| Float switch (33H) | X15A | — |
| Magnetic relay drain pump (RyP) | X25A | — |

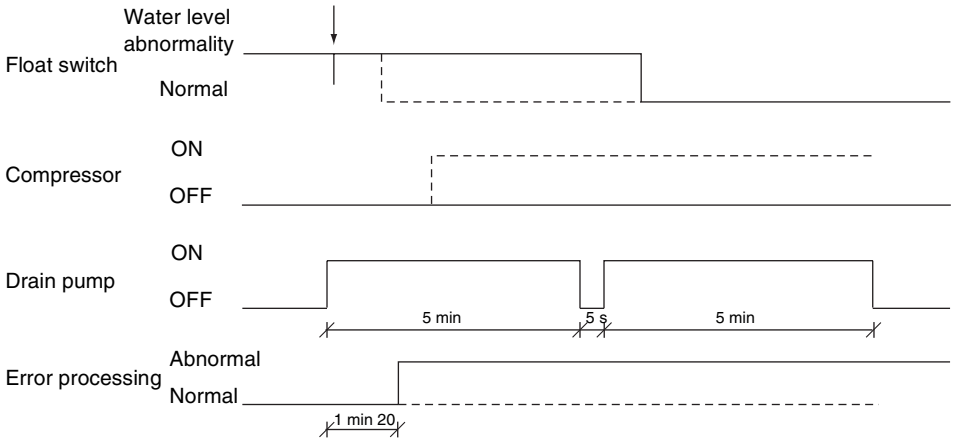
2

**Detection system**

All applicable units use a drain pan water level detection system of the float type.

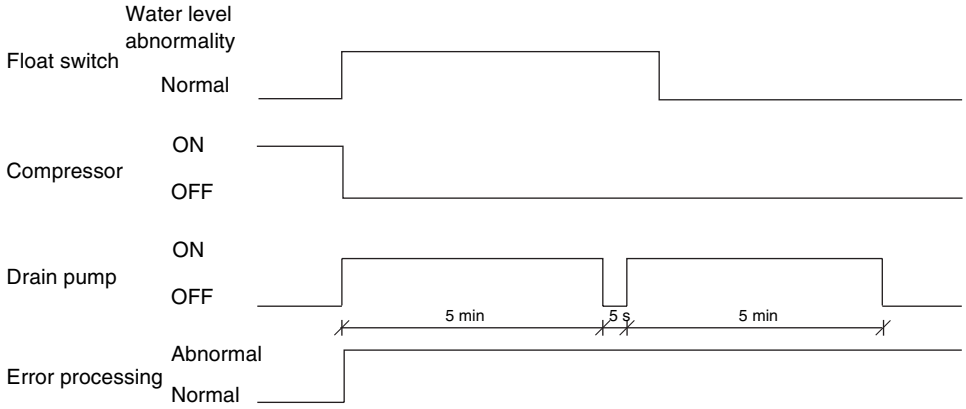
**Float type: During start-up**

The time chart below illustrates the drain pump control during start-up.




**Float type: During operation (compr. ON)**

The time chart below illustrates the drain pump control during start-up.



## 1.13 Fan and Flap Operations

**Heating operation** The table below contains the fan and flap operations.

| Function | In... | Fan | Flap (FCQ and FHQ) | Flap (FAQ) | Remote controller indication |
|---|---|---|---|---|---|
| Hot start after defrost | Swing operation | OFF | Horizontal | Horizontal | Swing |
| | Airflow direction setting | | | | Set position |
| Defrost | Swing operation | | | | Swing |
| | Airflow direction setting | | | | Set position |
| Thermostat OFF | Swing operation | LL | | | Swing |
| | Airflow direction setting | | | | Set position |
| Hot start after thermostat OFF (cold air prevention) | Swing operation | | | | Swing |
| | Airflow direction setting | | | | Set position |
| Stop (error) | Swing operation | OFF | | Fully closed (horizontal) | — |
| | Airflow direction setting | | | Fully closed | |
| Overload thermostat OFF | Swing operation | LL | | Horizontal | Swing |
| | Airflow direction setting | | | | Set position |

**Cooling operation** The table below contains the fan and flap operations.

| Function | In... | Fan | Flap (FCQ and FHQ) | Flap (FAQ) | Remote controller indication |
|---|---|---|---|---|---|
| Thermostat ON (microcomputer controlled dry keep mode) | Swing operation | L | Swing | Swing | Swing |
| | Airflow direction setting | | Set position | Set position | Set position |
| Thermostat OFF (microcomputer controlled dry keep mode) | Swing operation | OFF | Horizontal | Horizontal | Swing |
| | Airflow direction setting | | Set position | Set position | Set position |
| Thermostat OFF (cooling) | Swing operation | Setting | Horizontal | Horizontal | Swing |
| | Airflow direction setting | | Set position | Set position | Set position |
| Stop (error) | Swing operation | OFF | Horizontal | Downward (horizontal) | — |
| | Airflow direction setting | | Set position | Downward | |
| Freeze-up prevention in microcomputer controlled dry keep mode (including cooling operation) | Swing operation | L | Horizontal | Horizontal | Swing |
| | Airflow direction setting | | Set position | Set position | Set position |

## 1.14 Auto-Restart Function

**Applicable units**

All units

**Purpose**

The purpose of the auto-restart function is to resume the same operating mode after the power was turned OFF as when the unit was operating.

**Turning OFF power**

When you have to turn OFF the power supply in order to carry out maintenance, make sure to turn the remote controller's ON/OFF switch OFF firstly.

If you turn OFF the power supply while the remote controller's ON/OFF switch is still ON, the "auto-restart function" automatically starts the indoor fan immediately and the outdoor unit fan starts automatically 3 min after the power supply is turned back ON.

## 1.15 Using Conditions for Remote Controller Thermostat

**Applicable units**

All units

**Wired remote controllers**

The remote controller thermostat is only available in wired remote controls.

2

**Conditions in which the rem. contr. thermostat is not used**

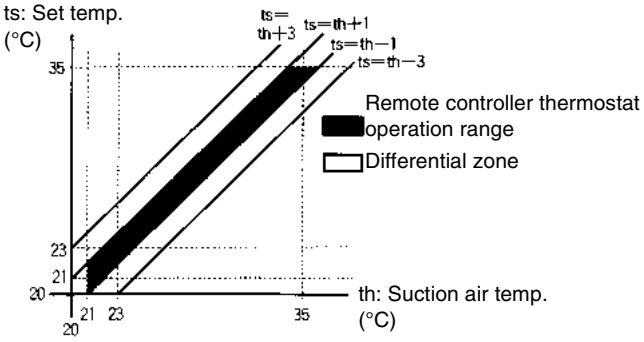
Even when the “use remote controller thermostat” is selected in service mode, the remote controller thermostat is not always used.

The table below contains the conditions in which the remote controller thermostat is not used.

| Condition | The remote controller thermostat is not used when... | Except... |
|---|---|---|
| 1 | The remote controller thermostat malfunctions. | — |
| 2 | Group control is used | — |
| 3 | The set temp./air suction temp. combination is out of range. See further in this section. | When the automatic operation is selected. If so, the remote controller can be used. |

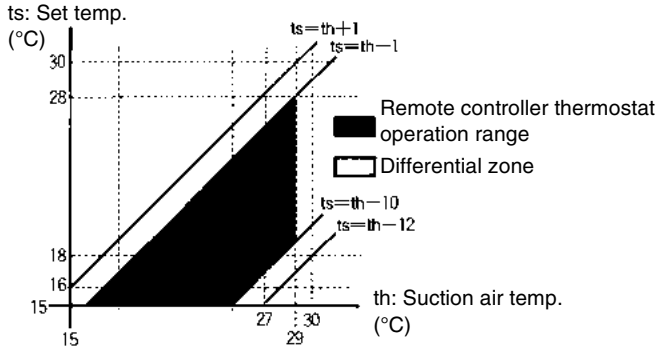
**Cooling**

The diagram below shows the operation range of the set temperature/air suction temperature combination.




**Heating**

The diagram below shows the operation range of the set temperature/air suction temperature combination.



## 1.16 Overcurrent Protection Function

**Purpose**

The purpose of the “Overcurrent Protection Function” is to protect the unit against excessive current drains.

**Method**

If the Current Transducer detects an overcurrent, the unit will trip on E6 error after 4 times detection.

| Unit | Compressor | Current (A) |
|---|---|---|
| RR/RQ71B7V3B | JT90G-V1N | 25.3 |
| RR/RQ71B7W1B | JT90G-YE | 11.5 |
| RR/RQ100B7V3B | JT125G-V1N | 38 |
| RR/RQ100B7W1B | JT125G-YE | 11.5 |
| RR/RQ125B7W1B | JT160G-YE | 15 |

“J2” will be displayed if the overcurrent detection sensor has a malfunction.

## 1.17 Expansion Valve Control

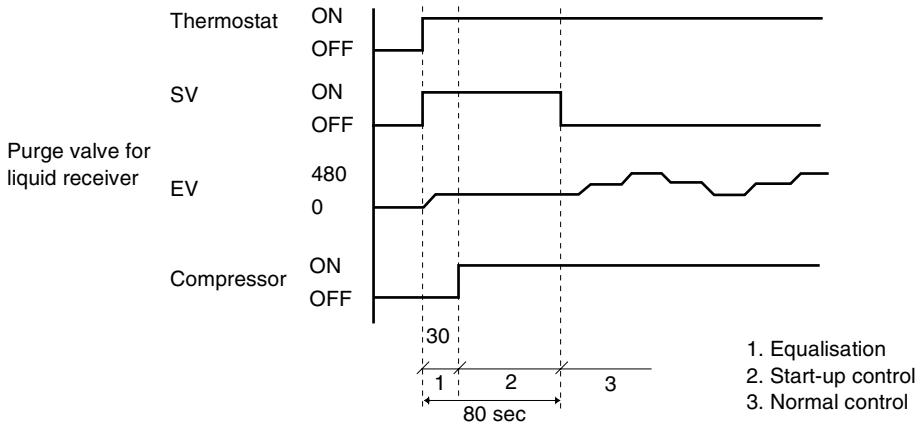
**Applicable units**

RR/RQ71~125B

**Start-up control**

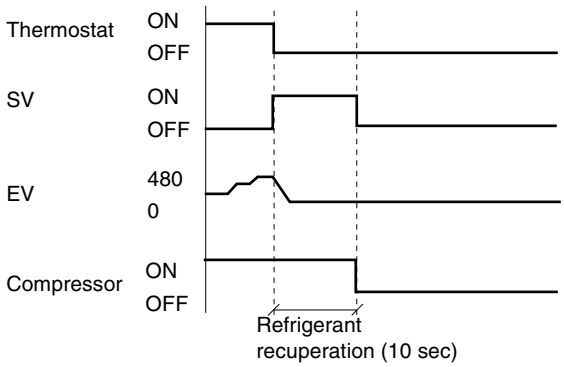
When the compressor starts, a pump down operation is carried out in order to avoid liquid pumping. The liquid receiver fills up and a minimum refrigerant amount is passed to the compressor. This minimum refrigerant amount is required to avoid abnormal high discharge pipe temperatures via the purge valve.

The opening degree of the expansion valve depends on the number of start-up. If the first start-up fails, the opening degree of the following start-up is adapted by the self-learning function.




**Pump down residual operation**

The unit conducts a pump down residual operation after thermostat OFF or stop operation from remote control. The purpose of this function is to collect the refrigerant in the liquid receiver in order to prevent refrigerant from remaining in the indoor heat exchanger.




**Initial opening degree**

The initial opening degree of the outdoor expansion valve depends on the indoor and outdoor air temperature. The calculation of the opening degree is made at a thermostat ON and at the end of a defrosting cycle.

**Opening degree: Self-learning function**

When the system was stopped due to abnormal suction or discharge pressure, or due to a abnormal high discharge temperature that is too high, the expansion valve control tries to avoid the same abnormal stop. The expansion valve increases the previous opening degree with 70 (in cooling mode) or 80 (in heating mode) pulses at the next start-up.

There are maximum five start-up attempts. When the compressor stops again after the fifth start-up, something is wrong with the unit and a unit check is necessary. The relevant error code appears on the remote controller.



**Normal control**

The optimum discharge pipe temperature is calculated based on:

- ➤ Indoor and outdoor heat exchanger temperature
- ➤ Actual discharge pipe temperature
- ➤ Outdoor ambient temperature.

When the startup control is terminated, the general control will determine the expansion valve opening. The expansion valve is controlled in order to approach the optimum temperature at the discharge pipe.

**Used input**

The motor operated valve control uses the following inputs:

| Input | Connection on indoor PCB | Connection on outdoor PCB |
|---|---|---|
| Outdoor thermistor | — | R1T |
| Outdoor heat exchanger thermistor | — | R2T |
| Discharge pipe thermistor | — | R3T |
| Indoor heat exchanger thermistor | R2T | — |

# 2 Overview of the cooling mode functions



## 2.1 What Is in This Chapter?

**Introduction**

This chapter contains information on the functions used to control the system when the system is in cooling mode. Understanding these functions is vital when diagnosing a malfunction that is related to the functional control.

**Overview**

This chapter contains the following topics:

## 2.2 Dry Keep Mode

**Applicable units**

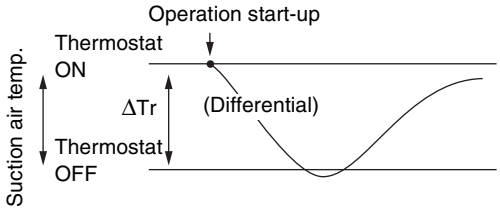
All units

**Purpose**

The purpose of the dry keep mode is to remove humidity while maintaining the room temperature.

**Method**

The points of thermostat ON or OFF are determined according to the suction air temperature at start-up of the unit operation. The set temperature and flow rate are not displayed on the remote controller.




**Thermostat**

When dry keep is selected on the remote controller, the unit detects the ambient temperature. This ambient temperature is then the setpoint. The thermostat is turned OFF when the air return temperature drops below this setpoint. The thermostat is turned ON in one of the following conditions:

| Suction air temperature | Thermostat ON | ΔTr |
|---|---|---|
| Tr ≥ 24°C | Tr | 1.5°C |
| 18°C ≤ Tr < 24°C | Tr | 1.0°C |
| Tr < 18°C | 18°C | |

**Operation condition**

The table below describes the operation condition.

| Compressor condition | ON | OFF |
|---|---|---|
| Fan speed | L | OFF |
| Flap angle | Set angle | PoO |
| Air flow direction set with remote controller | | Setting indication |

**Used input**

The dry keep function uses the following inputs:

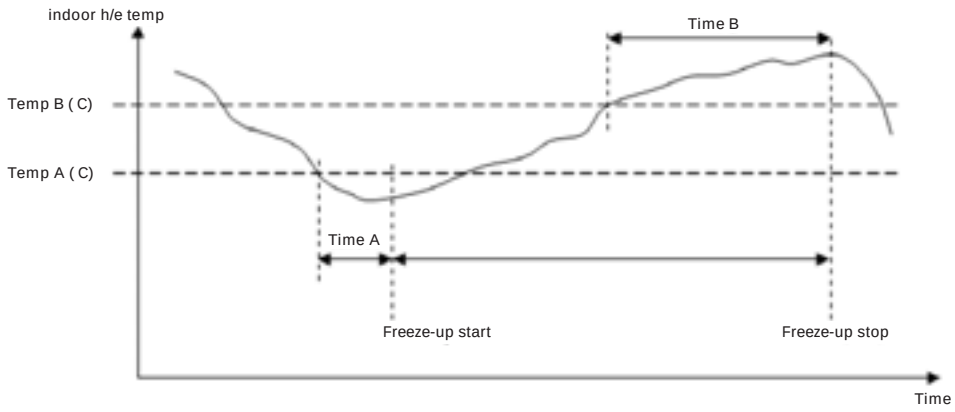
| Input | Connection on indoor PCB | Connection on outdoor PCB |
|---|---|---|
| indoor air temperature R1T | X19A | — |

## 2.3 Freeze-Up Function

**Starting conditions**

In order to avoid formation of ice on the indoor heat exchanger in cooling and dry mode, the system automatically starts up a freeze-up cycle when some specific conditions are fulfilled.

**Graph**




**Conditions**

| Start Conditions (OR) | Stop Conditions |
|---|---|
| ➤ Te ≤ -1°C for 25 min accumulated compressor operation time<br>➤ Te ≤ A°C for 1 minute continuous after ≥ 8 minutes continuous compressor operation time<br>➤ Te ≤ -1°C for 1 minute after ≥ 20 minutes continuous compressor operation time | ➤ Te > 10°C for 10 minutes continuously |

**Parameters**

The parameter value "A" mentioned in above conditions is decided depending on the type of indoor model as follows:

| Indoor unit | Value "A" |
|---|---|
| FAQ | -1°C |
| FHQ | -3°C |
| All other indoor models | -5°C |

## 2.4 Outdoor Fan Starting Control in Cooling or Dry Keep Mode

**Applicable units**

RR/RQ71~125B

**Purpose**

The purpose is to avoid that the discharge pressure would start to rise, and stop the unit.

2

**Method**

When the compressor starts, the fan keeps running for 3 min at starting fan speed. The starting fan speed depends on the ambient temperature. The different fan speeds for the according outdoor air temperatures are shown in the table below.

| Operating mode | Outdoor air temp. Ta | Starting fan speed | See further in this section... |
|---|---|---|---|
| Cooling mode, dry keep mode | area 1: Ta < 3°C | L speed (20 s (*) after compressor start) | Fan speed for Ta < 3°C |
| | area 2: 3°C ≤ Ta < 10°C | L speed | Different fan speeds |
| | area 3: 10°C ≤ Ta < 23°C | L speed | |
| | area 4: Ta ≥ 23°C | HH speed | |

(*) When cutting jumper J3, the 20 second timer is changed to 5 seconds

**Starting fan speed**

The outdoor fan will start 10 seconds before compressor start in order to:

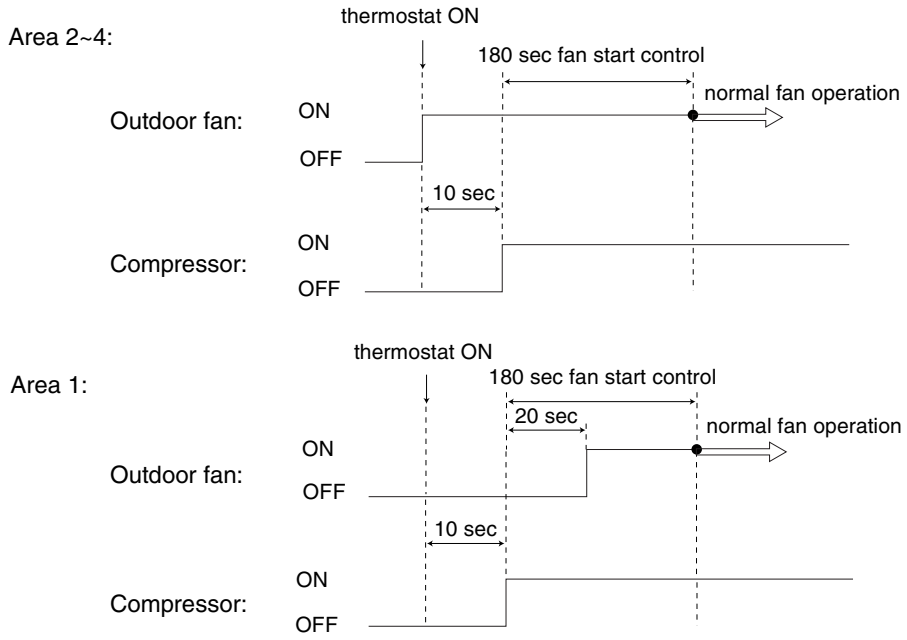
- ➤ minimize the stress to the compressor at startup
- ➤ avoid a heat draft after fan startup
- ➤ maximize the capacity at startup

**Fan speed for Ta < 3°C**

This fan starting control is made to be able to build up the compression ratio as soon as possible because this has two advantages:

- ➤ It is better for the compressor to increase the compression ratio because the lubrication must be done by the pressure difference between low and high pressure.
- ➤ The pressure difference is necessary for the h/p models to keep the 4-way valve in its correct position.





2

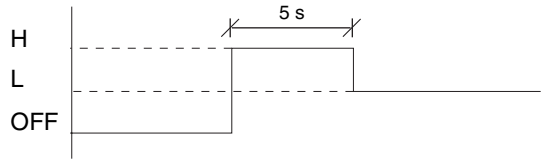
**Different fan speeds**

The table below explains the meaning of L, H and HH fan speed.

| Fan operation | 71 and 100 | 125 | |
|---|---|---|---|
| | 1 fan | Upper fan (MF1) | Lower fan (MF2) |
| OFF | OFF | OFF | OFF |
| L | L | L | L |
| H | H | H | H |
| HH | HH | HH | HH |

**L-tap starting compensation**

When the outdoor fan is operated from OFF to L-tap, the fan motor does not turn, because of lack of starting torque. To avoid this, the fan motor operates at H-tap for the first 5 s after start-up, before changing to L-tap.




**Used input**

The fan starting control in cooling or dry keep mode uses the following inputs:

| Input | Connection on indoor PCB | Connection on outdoor PCB |
|---|---|---|
| Outdoor air temperature R1T | — | X4A |

## 2.5 Normal Outdoor Fan Control in Cooling Operation

**Applicable units**

RR/RQ71~125B

**Purpose**

The purpose of this normal outdoor fan control is to ensure a correct discharge pressure in function of the outdoor air and indoor room temperature.

**Method**

The table below shows in which conditions the outdoor fan works at low or high speed.

| Condition | Fan Speed |
|---|---|
| Ta < -7°C | OFF |
| Ta < 41.7 - 0.84 x Tr | L speed |
| Ta > 45.7 - 0.84 x Tr | H speed |
| Tc > 53°C | HH speed |

Ta = ambient temperature = outdoor air temperature; Tr = room suction temperature; Tc = condensing temperature (overload control)

**Different fan speeds**

The table below explains the meaning of L, H and HH fan speed.

| Fan operation | 71 and 100 | 125 | |
|---|---|---|---|
| | 1 fan | Upper fan (MF1) | Lower fan (MF2) |
| OFF | OFF | OFF | OFF |
| L | L | L | L |
| H | H | H | H |
| HH | HH | HH | HH |

**Used input**

The normal outdoor fan control during cooling operation uses the following inputs:

| Input | Connection on indoor PCB | Connection on outdoor PCB |
|---|---|---|
| Indoor room temperature R1T | X19A | — |
| Outdoor air temperature R1T | — | X4A |

**Low outside temperature control (Year round cooling)**

The purpose of this control is to prevent freezing of the indoor heat exchanger due to a low pressure drop by reducing the air flow volume of the outdoor unit fan.

The control is activated when the outdoor temperature drops below (41.7 - 0.84 x Tr).
At this temperature, the outdoor fan speed switches to L-tap.

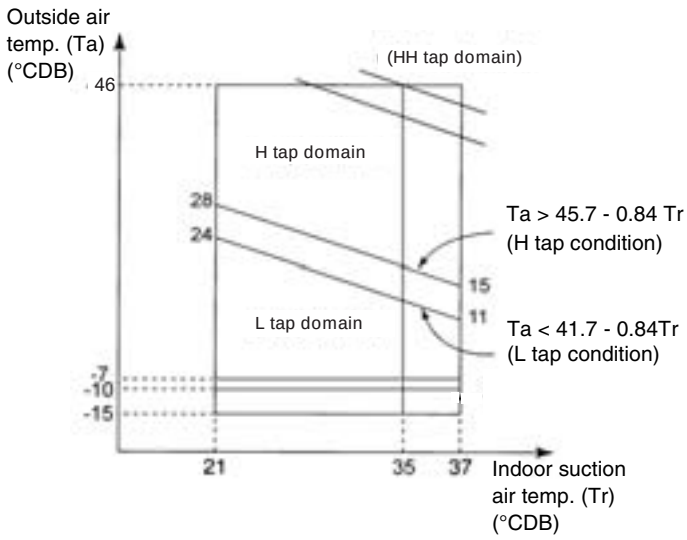
The differential for the return is 4 K.

The control is not activated during start-up control.

2

**Fan speed control graph**

The graph below shows the relation between inside and outside temperature and the fan speed:.



## 2.6 High Pressure Protection Control in Cooling Operation

**Applicable units**

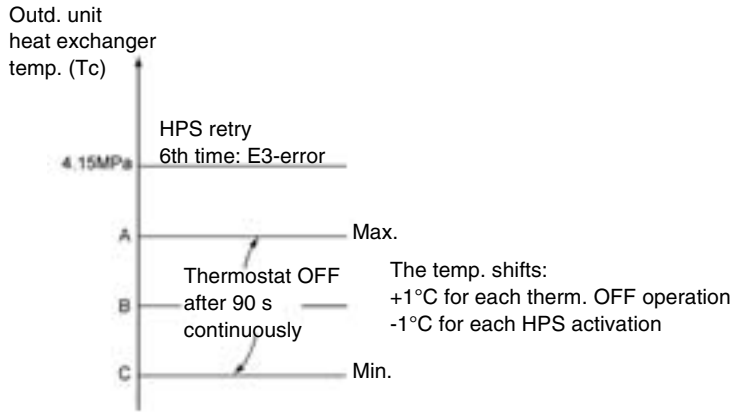
RR/RQ71~125B

**Purpose**

The purpose of the high pressure protection is to prevent a shutdown due to an error.

**Method**

The thermostat turns OFF immediately before HPS activation according to the outdoor heat exchanger temperature (Tc).




**Parameters**

| | 71 | 100 | 125 |
|---|---|---|---|
| A | 61 °C | 60 °C | 62 °C |
| B | 58 °C | 57 °C | 59 °C |
| C | 53 °C | 52 °C | 54 °C |

# 3 Overview of the heating mode functions



## 3.1 What Is in This Chapter?

**Introduction**

This chapter contains information on the functions used to control the system during heating mode. Understanding these functions is vital when diagnosing a malfunction that is related to the functional control. This chapter is only applicable to h/p units.

**Overview**

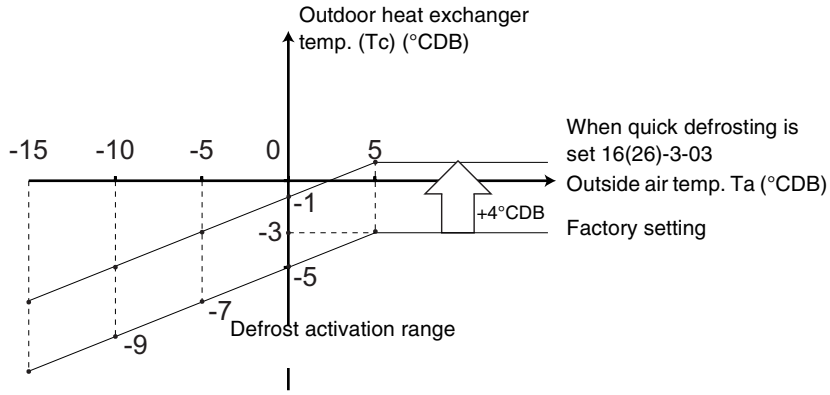
This chapter contains the following topics:

## 3.2 Defrost Control

**Applicable units** RQ71~125B

**Purpose** The purpose of the defrost control is to prevent frost on the outdoor heat exchanger coil. This frost forms when the unit is in heating position.

**Starting conditions** The defrosting starts when either condition 1 or 2 has been realized.

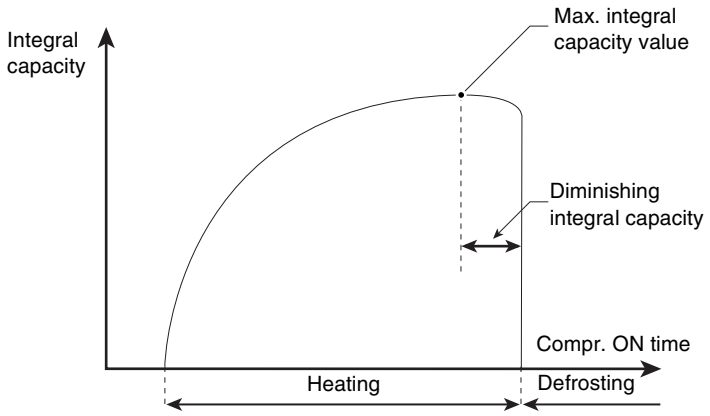
<table>
<tr><th>Condition 1</th><th>Condition 2</th></tr>
<tr><td colspan="2">The compressor has been running for a total of 25 min accumulated since the start of heating operation or since the end of the previous defrosting.</td></tr>
<tr><td colspan="2">➤ Outdoor heat exchanger temp. ≤ -3°C, and<br>➤ Outdoor heat exchanger temp. ≤ 0.4 x Ta - 5°C<br> 
</td></tr>
<tr><td>➤ Compressor ON ≥ 5 min continuously, and integral heating capacity diminishes (see further in this section), AND<br>➤ Defrost upper limit time A is met.</td><td>Above condition for 10 min accumulated.</td></tr>
<tr><td>Outdoor fan is ON (not in overload control)</td><td>Outdoor fan is OFF (overload control)</td></tr>
</table>

**Defrost upper limit A**

| | When quick defrost starting is set 16(26)-3-03 | Factory setting 16(26)-3-01 | When slow defrost starting is set 16(26)-3-02 |
|---|---|---|---|
| Outdoor temp > -5°C | 40 minutes | 3 hours | 24 hours |
| Outdoor temp ≤ -5°C | 40 minutes | 6 hours | 24 hours |

**Heating integral capacity**

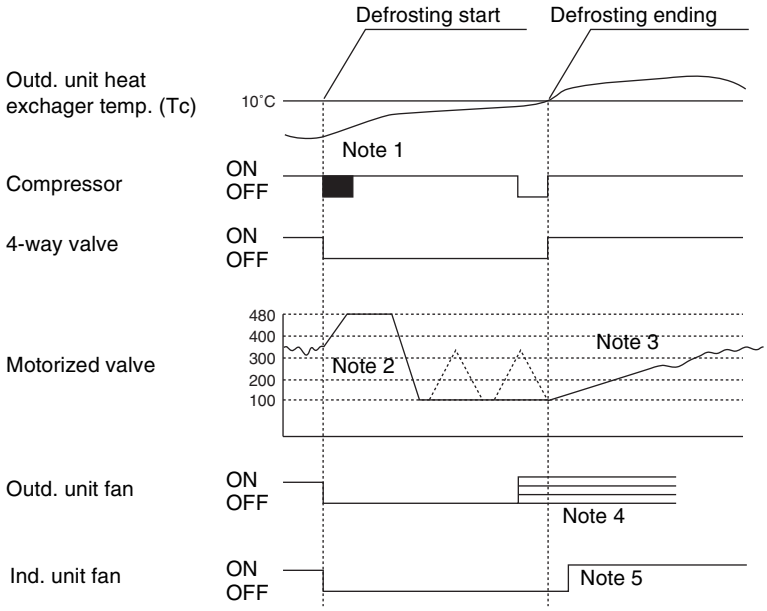
The integral heating capacity is calculated by using the indoor unit data (R2T - R1T) divided by the compressor running time.




At the same time of setting field setting 16(26)-3-03, defrost starting becomes 4°C higher.

**Defrost control**

The illustration below shows the defrost control.




| Note | Control and time | Description |
|---|---|---|
| 1 | Compressor operation at defrost start | Compressor OFF for 90 seconds only in case outdoor ambient > 9°C and indoor ambient > 24°C. |
| 2 | Motorized valve control during defrost operation | After a defrost activation, the defrost motorized valve is at 480 pulses for a certain amount of time, and is then closed gradually to 100 pulses.<br>Only when the discharge pipe temperature is high during defrost, the motorized valve opens at intervals. |
| 3 | Motorized valve control after defrost operation | The motorized valve is controlled to an optimum opening and the most suitable operating speed, according to the operating conditions after defrost activation. |

| Note | Control and time | Description |
|---|---|---|
| 4 | Outdoor unit fan after defrost operation | The fan operates at optimum fan tap, according to the operating conditions after defrost activation. |
| 5 | Hot start after defrost | The unit remains in the hot start standby (indoor unit fan OFF) mode for:<br>➤ 40 s after defrost ending, or<br>➤ Until the indoor heat exchanger temperature increases. |

2

**Defrost ending**

The defrost operation ends:

➤ After 10 min, or

➤ As soon as one of the following conditions is met after 1 min or more:
- Outdoor heat exchanger temp. ≥ 10°C
- Discharge pipe temp. > 110°C.

**Hot start after defrosting**

The hot start function is activated:

➤ 40 s after the defrosting ending, or

➤ When Tc > 34°C (indoor heat exchanger temperature).

**Used input**

The defrost control uses the following inputs:

| Input | Connection on indoor PCB | Connection on outdoor PCB |
|---|---|---|
| Outdoor thermistor | — | R1T |
| Outdoor heat exchanger thermistor | — | R2T |
| Discharge pipe thermistor | — | R3T |

## 3.3 4-way Valve Control

**Applicable units**

RQ71~125B

**Purpose**

The purpose of the 4-way valve control is to control how the superheated refrigerant passes through the 4-way valve. The 4-way valve control carries out the changeover switching of the 4-way valve. This changeover switching is only carried out during operation, because pressure difference is required to move the internal cylinder.

| When... | Then the 4-way valve connects the outlet of the compressor with... |
|---|---|
| Cooling | Outdoor heat exchanger. |
| Heating | Indoor heat exchanger. |

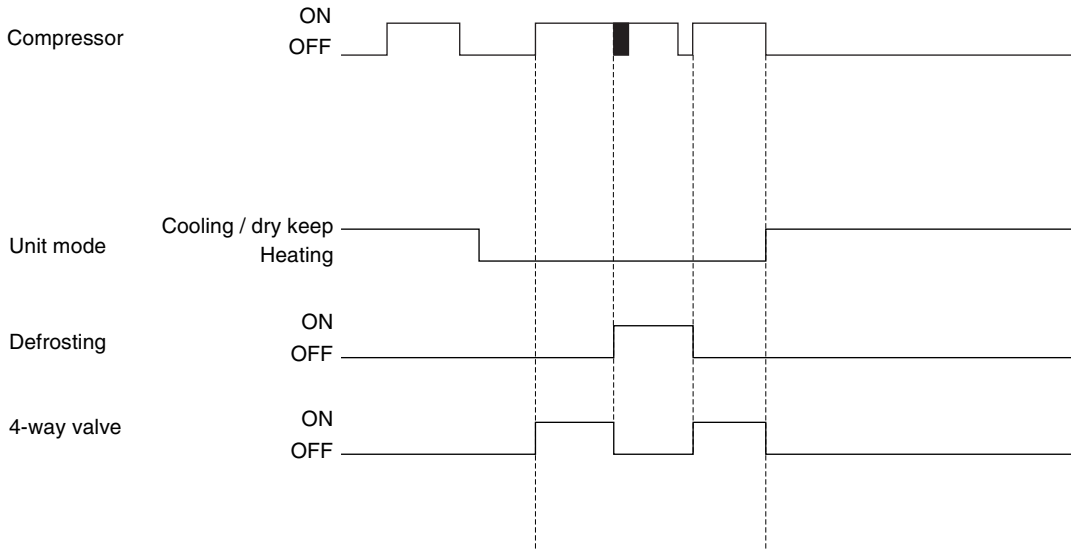
**Method**

The table below describes the 4-way valve control operation.

| In... | The 4-way valve is... |
|---|---|
| Heating, except for defrosting | ON |
| ➤ Cooling<br>➤ Dry keep<br>➤ Defrosting | OFF |

**Time chart**

The time chart below illustrates the 4-way valve control.




**Used input**

The 4-way valve control uses the following inputs:

| Input | Connection on indoor PCB | Connection on outdoor PCB |
|---|---|---|
| Indoor air temperature R1T (auto changeover) | X19A | — |
| Outdoor heat exchanger temperature R2T (defrost) | — | X5A |

## 3.4 Starting Outdoor Fan Control in Heating Mode

**Applicable units**

RQ71~125B

**Purpose**

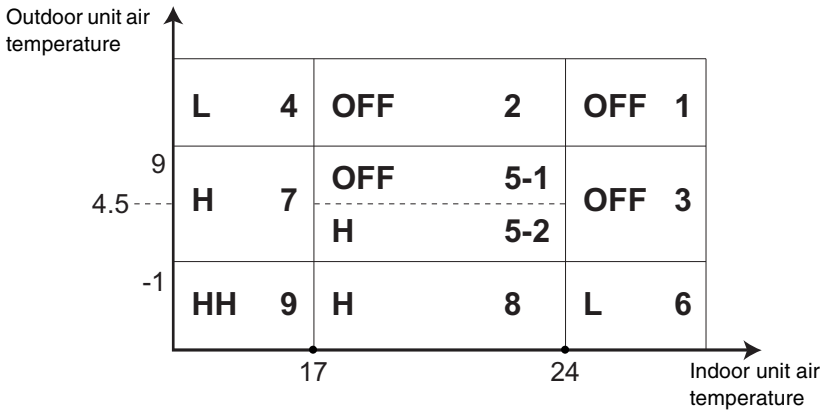
The purpose of the starting outdoor fan control is to control the fan speed in function of the indoor and outdoor unit air temperature.

**Method**

The illustration below shows the fan starting control in heating mode.

- ➤ LPS is not detected for 3 min after start-up.
- ➤ Units operate with the starting air flow volume for at least 5 minutes. The air flow volume stays at H for the first 5 seconds if it is switched from OFF to L.

The fan operating areas 1 ~ 9 are indicated.




**Different fan speeds**

The table below explains the meaning of L, H and HH fan speed.

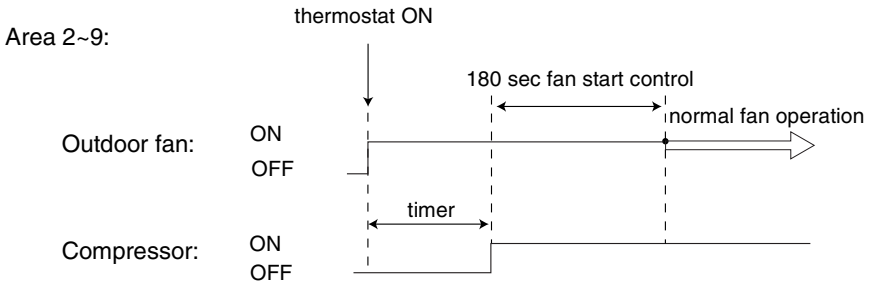
| Fan operation | 71 and 100 | 125 | |
|---|---|---|---|
| | 1 fan | Upper fan (MF1) | Lower fan (MF2) |
| OFF | OFF | OFF | OFF |
| L | L | L | L |
| H | H | H | H |
| HH | HH | HH | HH |

**Used input**

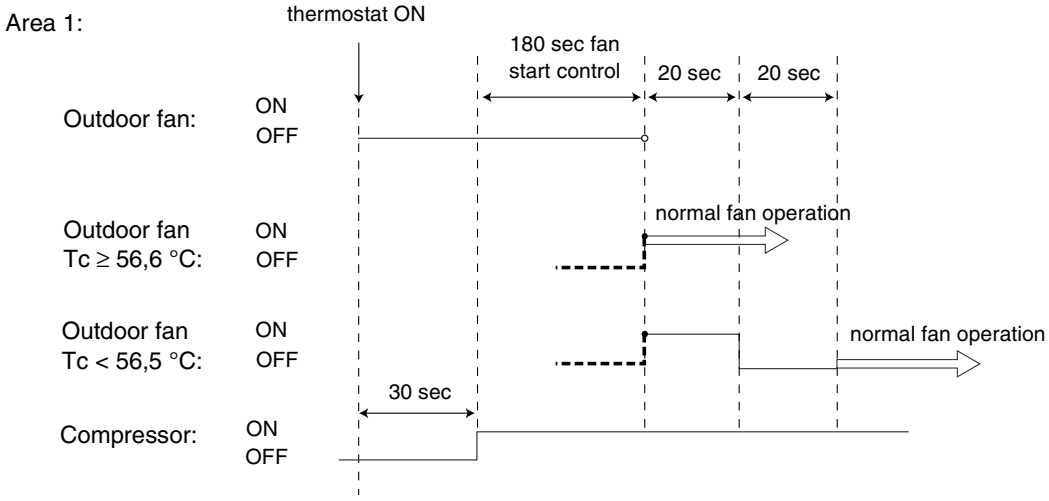
The outdoor fan starting control in heating mode uses the following inputs:

| Input | Connection on indoor PCB | Connection on outdoor PCB |
|---|---|---|
| Outdoor thermistor | — | R1T |
| Suction thermistor | R1T | — |
| Outdoor coil thermistor | — | R2T |

**Time charts**




| | Area 1, 2, 3 | Area 4, 5, 6, 7, 8, 9 |
|---|---|---|
| Timer | 30 seconds | 10 seconds |



## 3.5 Normal Outdoor Fan Control in Heating Mode

**Applicable units**

RQ71~125B

**Purpose**

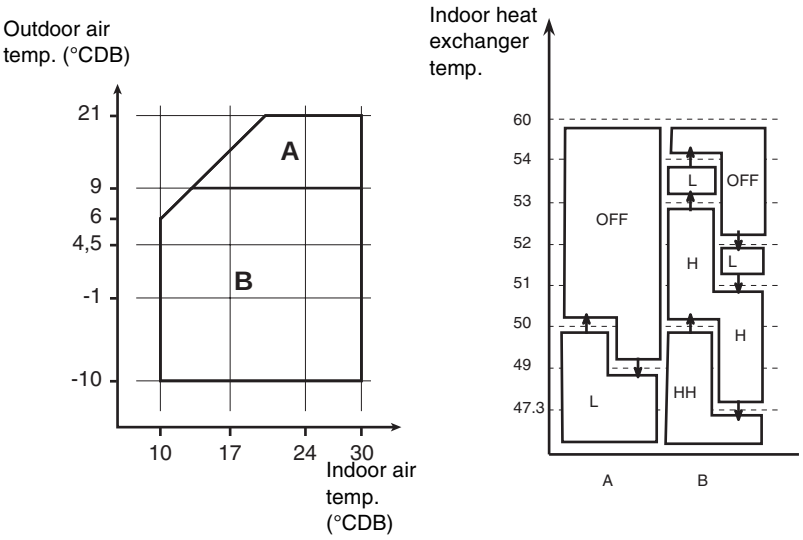
The purpose of the normal outdoor fan control is to:

- ➤ Reduce the chance of overload during high ambient temperature.
- ➤ Reduce the chance of icing up.

**Method**

Normal fan control operation is done after 5 min of starting fan control operation.

The operation range is divided into two areas (A and B).




**Example**

For area A, the fans go:

- ➤ From L speed to OFF at 51°C
- ➤ From OFF to L speed at 49°C.

**Different fan speeds**

The table below explains the meaning of L, H and HH fan speed.ì

| Fan operation | 71 and 100 | 125 | |
|---|---|---|---|
| | 1 fan | Upper fan (MF1) | Lower fan (MF2) |
| OFF | OFF | OFF | OFF |
| L | L | L | L |
| H | H | H | H |
| HH | HH | HH | HH |

**Used input**

The normal outdoor fan control during heating operation uses the following inputs:

| Input | Connection on indoor PCB | Connection on outdoor PCB |
|---|---|---|
| Outdoor thermistor | — | R1T |
| Suction thermistor | R1T | — |
| Indoor heat exchanger thermistor | R2T | — |

2

# Part 3
# Troubleshooting



**What is in this part?** This part contains the following chapters:

3

# 1 Troubleshooting

## 1.1 What Is in This Chapter?

**Introduction**

When a problem occurs, you have to check all possible malfunctions. This chapter gives a general idea of where to look for malfunctions.

Not all repair procedures are described. Some procedures are considered common practice.

**Overview**

This chapter contains the following topics:

## 1.2 Overview of General Problems

**Introduction**

The general problems are:

- ➤ None of the indoor units operates
- ➤ Equipment operates but stops sometimes
- ➤ Some indoor units do not operate (twin / triple)
- ➤ Equipment operates but is not able to cool
- ➤ Abnormal operating noise and vibrations
- ➤ Equipment does not operate (operation light OFF)
- ➤ Poor cooling or heating
- ➤ Operation stops suddenly (operation light flashes)
- ➤ Abnormal functioning.



**None of the indoor units operates**

To troubleshoot, check the following:

- ➤ Make sure the rated voltage is supplied.
- ➤ Make sure the indoor unit type is compatible with the outdoor unit.
- ➤ Troubleshoot with the indoor unit LEDs. See page 3-16.
- ➤ Troubleshoot with the remote control: outdoor malfunctions. See page 3-17.
- ➤ Make sure the address for the remote controller and indoor unit are set correctly. See page 4–5.

**Equipment operates but stops sometimes**

To troubleshoot, check the following:

- ➤ A power failure of 2 to 10 sine wave cycles can stop air conditioner operation.
- ➤ Troubleshoot with the indoor unit LEDs. See page 3–16.

**Some indoor units do not operate (twin / triple)**

To troubleshoot, check the following:

- ➤ Make sure the indoor unit type is compatible with the outdoor unit.
- ➤ Troubleshoot with the indoor unit LEDs. See page 3–16.
- ➤ Troubleshoot with the remote control: outdoor malfunctions. See page 3-17.

**Equipment operates but is not able to cool**

To troubleshoot, check the following:

- ➤ Make sure the thermistor is not disconnected from the pipe holder.
- ➤ Troubleshoot with the indoor unit LEDs. See page 3–16.
- ➤ Troubleshoot with the remote control: outdoor malfunctions. See page 3-17.
- ➤ Check for gas shortage. See page 3–62.

**Abnormal operating noise and vibrations**

Make sure the required space for installation is provided. See chapter “General Outline: Outdoor Units”.

**Equipment does not operate (operation light OFF)**

To troubleshoot, check the following:

- ➤ Check if the breaker has switched OFF or the fuse has blown.
- ➤ Check if the batteries are placed in the remote controller.
- ➤ Check if the address switch is set correctly. See page 4–5.
- ➤ Check if the timer is set correctly.

**Poor cooling or heating**

To troubleshoot, check the following:

- ➤ Check if the filters are clean.
- ➤ Check if there is no obstruction of the air inlet or outlet of the indoor and outdoor units.
- ➤ Check if the temperature settings are correct.
- ➤ Check if all windows and doors are closed.
- ➤ Check if the air flow and air direction are set correctly.
- ➤ Check if the unit is not set to "fan-only” operation.

**Operation stops suddenly (operation light flashes)**

To troubleshoot, check the following:

- ➤ Check if the air filters are clean.
- ➤ Check if there is no obstruction of the air inlet or outlet of the indoor and outdoor units.

The operation light flashes when the following errors are detected:

- ➤ Activation of a safety device or malfunctioning thermistors.
- ➤ Transmission error between the indoor and the outdoor unit.

**Abnormal functioning**

The air conditioner may malfunction due to lightning or radio waves. To check, proceed as follows:

| Step | Action |
|---|---|
| 1 | Switch OFF the breaker. |
| 2 | Switch it back ON. |
| 3 | Check the operation by trying to operate with the remote controller. |

## 1.3 ON/OFF Operation in Case of Wireless Remote Controller

When the wireless remote controller is not available or its battery is dead, you can use the ON/OFF button on the front panel of the indoor unit :

- ➤ To start the automatic mode, press the ON/OFF button.
- ➤ To stop the automatic mode, press the button again.

## 1.4 Checking with the Wired Remote Controller

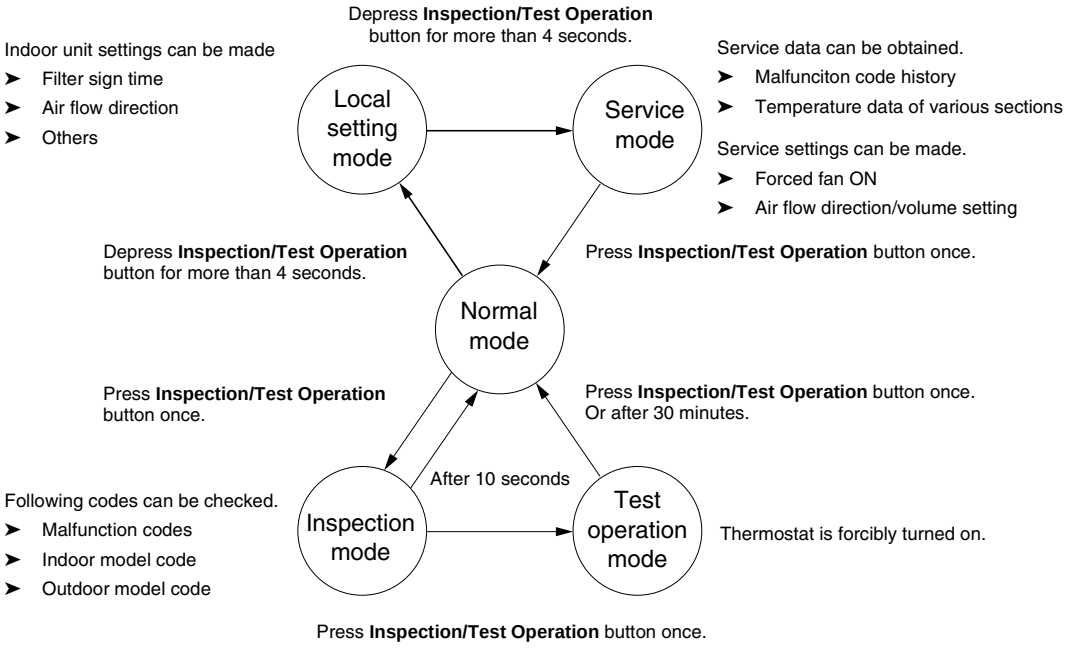
**Checking with the wired remote controller**

If the operation stops due to a malfunction, the remote controller's operation LED flashes, and the controller displays the error code. The error code helps you to troubleshoot. See page 3–16, 3–17 and 3–18.

## 1.5 Procedure of Self-Diagnosis by Remote Controller

**The Inspection/Test Button: explanation**

By turning the remote controller's inspection/test button ON, you can change the mode as shown in the figure below.



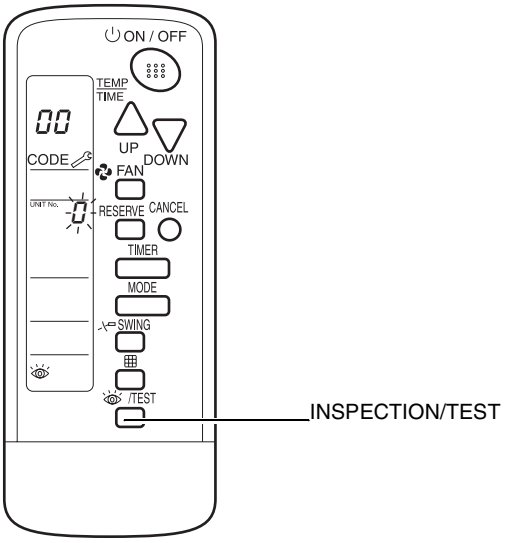
## 1.6 Checking with the Wireless Remote Controller Display

**Introduction**

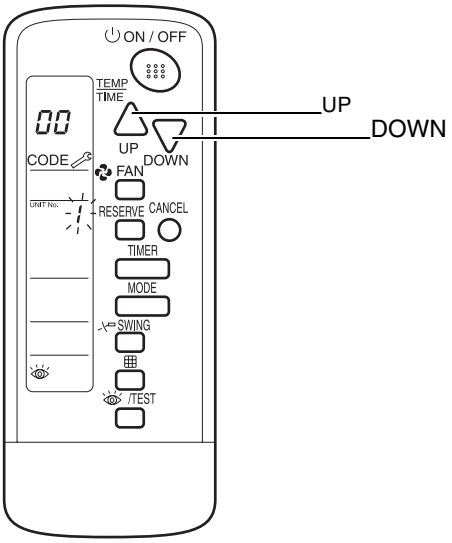
Contrary to the wired remote controller, the wireless remote controller does not display the error code. Instead, the operation LED on the light reception section flashes.

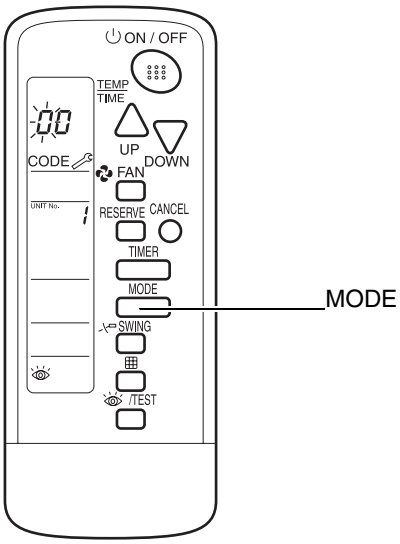
**Checking**

To find the error code, proceed as follows:

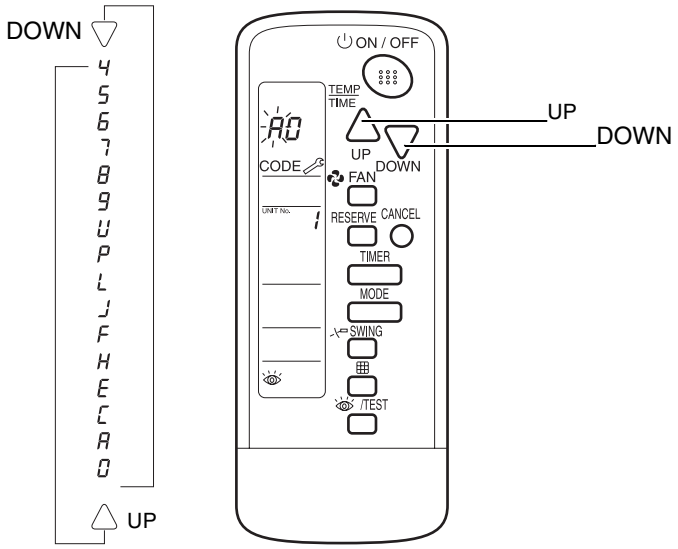
| Step | Action |
|---|---|
| 1 | Press the INSPECTION/TEST button to select “inspection”. The equipment enters the inspection mode. “0” flashes in the UNIT No. display.   |

3

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>2</td><td>Press the UP or DOWN button and change the UNIT No. until the receiver of the remote controller starts to beep.<br> 

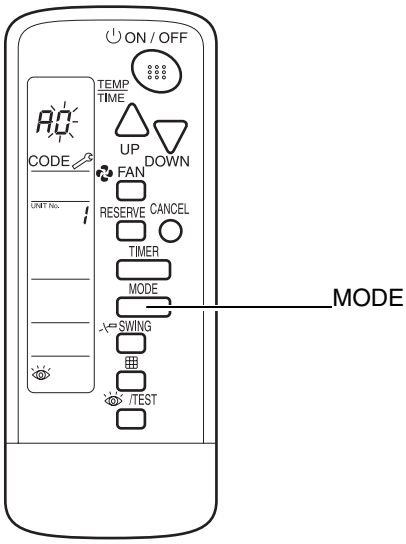
<table>
<tr><th>If you hear...</th><th>Then...</th></tr>
<tr><td>3 short beeps</td><td>Follow all steps below.</td></tr>
<tr><td>1 short beep</td><td>Follow steps 3 and 4. Continue the operation in step 4 until you hear a continuous beep. This continuous beep indicates that the error code is confirmed.</td></tr>
<tr><td>1 continuous beep</td><td>There is no abnormality.</td></tr>
</table></td></tr>
<tr><td>3</td><td>Press the MODE selector button.The left “0” (upper digit) indication of the error code flashes.’<br> 
</td></tr>
</table>

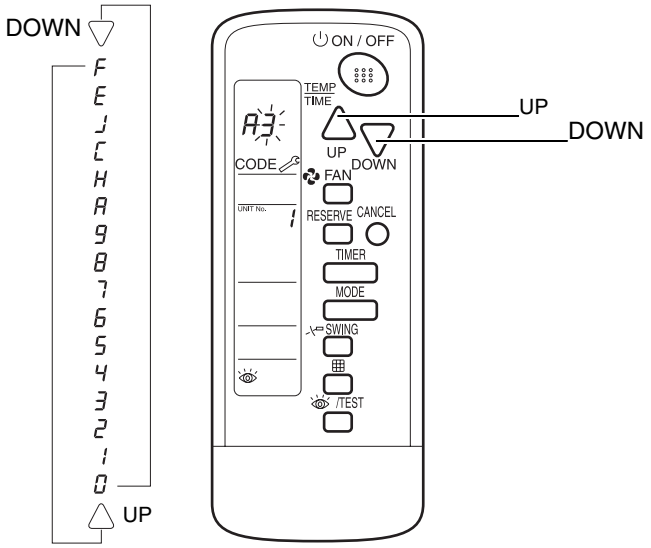
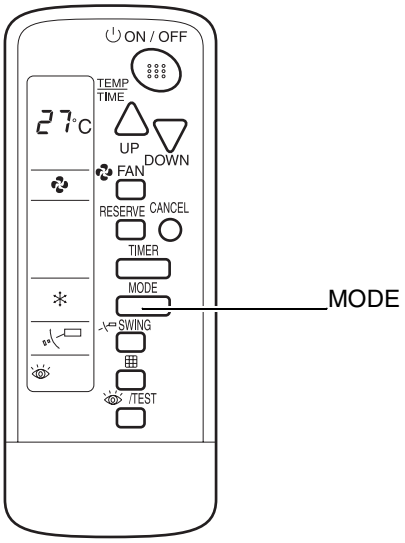
| Step | Action |
|---|---|
| 4 | Press the UP or DOWN button to change the error code upper digit until the receiver of the remote controller starts to beep. |




| If you hear... | Then... |
|---|---|
| 2 short beeps | The upper digit matches. |
| 1 short beep | No digits match. |
| 1 continuous beep | Both upper and lower digits match. |

| | |
|---|---|
| 5 | Press the MODE selector button.The right “0” (lower digit) indication of the error code flashes. |

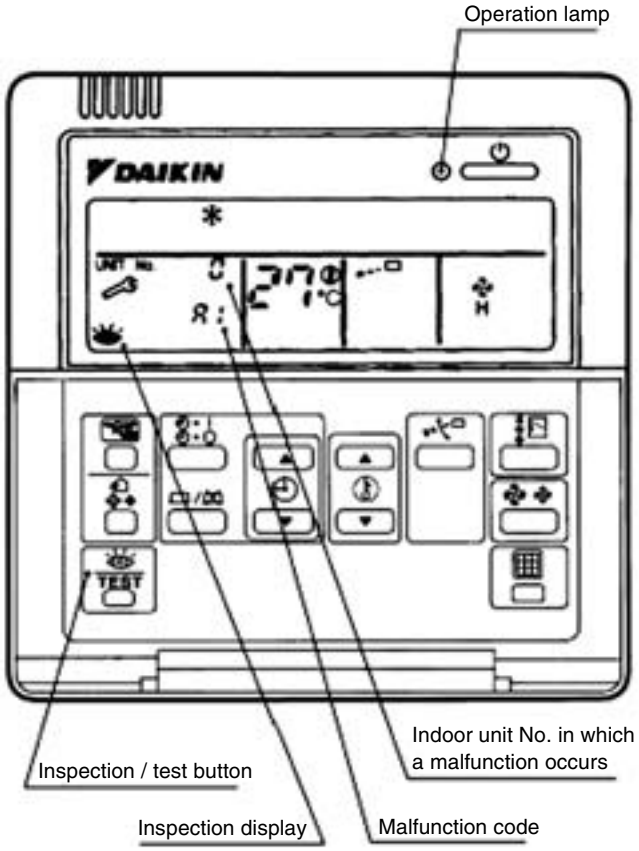


| Step | Action |
|---|---|
| 6 | Press the UP or DOWN button and change the error code lower digit until the receiver of the remote controller generates a continuous beep.<br>  |
| 7 | Press the MODE button to return to normal status. If you do not press any button for at least 1 min, the remote controller returns automatically to normal status.<br>  |

## 1.7 Self-Diagnosis by Wired Remote Controller

**Explanation**

If the operation stops due to a malfunction, the remote controller's operation LED blinks, and malfunction code is displayed. (Even if stop operation is carried out, malfunction contents are displayed when inspection mode is entered.) The malfunction code enables you to tell what kind of malfunction caused operation to stop. See page 3-14 for malfunction code and malfunction contents.
<New Remote Controller> BRC1D527



## 1.8 Remote Controller Display Malfunction Code and Contens

| Malfunction Code | Contents/Processing | Remarks |
|---|---|---|
| A1 | Failure of PC board ass'y for indoor unit | |
| A3 | Malfunction of water level system | |
| A6 | Indoor unit fan motor overload / overcurrent / lock | |
| AF | Malfunction of water level system | Float switch is OFF during indoor unit stops. |
| AJ | Failure of capacity setting | Either capacity data is set incorrectly, or capacityhas not been set for the data IC. |
| C4 | Malfunction of heat exchanger temperature sensor system | |
| C9 | Malfunction of suction air temperature sensor system | |
| CJ | Malfunction of remote control temperature sensor system | The remote controller thermistor does not function, but the system thermostat operation is possible. |
| E0 | Actuation of safety device (outdoor unit) | |
| E1 | Outdoor P.C. board malfunction | |
| E3 | High pressure malfunction (outdoor unit) | |
| E4 | Low pressure malfunction (outdoor unit) | |
| E6 | Compressor overcurrent | |
| E9 | Malfunction of electronic expansion valve (outdoor unit) | |
| F3 | Discharge pipe temperature malfunction (outdoor unit) | |
| H3 | Failure of high pressure switch (outdoor unit) | |
| H9 | Malfunction of outdoor air temperature sensor system (outdoor unit) | (See Note below) |
| J2 | Malfunction of current sensor system | |
| J3 | Malfunction of discharge pipe temperature sensor system (outdoor unit) | |
| J6 | Malfunction of heat exchanger temperature sensor system (outdoor unit) | (See Note below) |
| PJ | Failure of capacity setting (outdoor unit) | Either capacity data is set incorrectly, or capacity has not been set for the data IC. |
| U0 | Malfunction of suction pipe temperature | |
| U1 | Reverse phase | Switch R.S.T. of the 3-phase power supply. |

| Malfunction Code | Contents/Processing | Remarks |
|---|---|---|
| U4 or UF | Failure of transmission (between indoor and outdoor unit) | Wrong wiring between indoor and outdoor units or malfunction of the PC board mounted on the indoor and the outdoor units. If UF is shown, the wiring between the indoor and outdoor units is not properly wired. Therefore, immediately disconnect the power supply and correct the wiring. (The compressor and the fan mounted on the outdoor unit may start operation independent of the remote controller operation.) |
| U5 | Failure of transmission (between indoor unit and remote controller) | Transmission between indoor and remote controller is not being correctly carried out. |
| U8 | Failure of transmission (between "main" and "sub" remote controller) | Transmission between "main" and "sub" remote controller is not being correctly carried out. |
| UA | Failure of field setting | System setting mistake for Twin system. |
| UC | Address duplication of central remote controller | |

➤ In the case of the shaded error codes, "inspection" is not displayed. The system operates, but be sure to inspect and repair it.

**Note** Operation when a malfunction occurs may differ according to the model.

## 1.9 Troubleshooting with the Indoor Unit LEDs and the Remote Controller

**Shutdown**

For some errors, the system only shuts down when the error occurs several times. This means that you have to wait until the system shuts down to be able to see the flashing LED on the front panel and the error code on the remote controller.

**Malfunction overview**

The table below contains an overview of the indoor unit malfunctions.

| If... | | | | Then... | | | |
|---|---|---|---|---|---|---|---|
| LED front panel | Indoor unit LED | | Remote controller display | Location of the malfunction | | Malfunction description | See page |
| | H1P (HAP) | H2P (HBP) | | Other than PCB | PCB ind. unit | | |
| ● | ☀ | ☀ | Note 1 | — | — | Normal | — |
| ☀ | ☀ | ☼ | A1 | — | ○ | Malfunctioning Indoor PCB (A1) | 3–26 |
| | ☀ | ● | | | | | |
| | ☼ | — | | | | | |
| | ● | — | | | | | |
| | ☀ | ☀ | A3 | ◎ | — | Malfunctioning Drain Water Level System (A3) | 3–27 |
| | | | A6 | ◎ | □ | Indoor Unit Fan Motor Lock (A6) | 3–29 |
| | | | AF | ◎ | ○ | Malfunctioning Drain System (AF) | 3–31 |
| | | | AJ | ◎ | ○ | Malfunctioning Capacity Setting (AJ) | 3–32 |
| | | | C4 or C9 | ◎ | □ | Thermistor Abnormality (C4 or C9) | 3–34 |
| | | | CJ | ◎ | ○ | Malfunctioning Remote Controller Air Thermistor (CJ) | 3–36 |

**Symbols and notes**

The table below describes the symbols and notes used in the malfunction overview.

| Symbol / note | Description |
|---|---|
| Note 1 | Variety of circumstances |
| ☼ | LED is ON |
| ☀ | LED is flashing |
| ● | LED is OFF |
| ◎ | High probability of malfunction |
| ○ | Low probabiltiy of malfunction |
| □ | No possibility of malfunction (do not replace) |

## 1.10 Troubleshooting with the Remote Controller: Outdoor Malfunctions

**Malfunction overview**

The table below contains an overview of the outdoor unit malfunctions.

| Outdoor Unit Malfunctions | Remote Controller Display | Location of Malfunction | | | | Contents of Malfunction | Details of Malfunction (Reference page) |
|---|---|---|---|---|---|---|---|
| | | Other than PC Board | PC Board | | | | |
| | | | Outdoor Unit | Indoor unit | Remote Contr. | | |
| | E0 | ◎ | □ | — | — | Actuation of safety device | 3–38 |
| | E1 | — | ○ | — | — | Outdoor P.C. board malfunction | 3–42 |
| | E3 | ◎ | — | — | — | High pressure system (HPS) malfunction | 3–43 |
| | E4 | ◎ | — | — | — | Low pressure system (LPS) malfunction | 3–45 |
| | E6 | ◎ | □ | — | — | Compressor Overcurrent | 3–47 |
| | E9 | ◎ | □ | — | — | Malfunction of electronic expansion valve | 3–49 |
| | F3 | ◎ | □ | — | — | Discharge pipe temperature malfunction | 3–51 |
| | H3 | ◎ | □ | — | — | Failure of high pressure switch | 3–53 |
| | H9 | ◎ | □ | — | — | Malfunction of outdoor air temperature sensor system | 3–54 |
| | J2 | — | ○ | — | — | Malfunction of current sensor system | 3–57 |
| | J3 | ◎ | □ | — | — | Malfunction of discharge pipe temperature sensor system | 3–55 |
| | J6 | ◎ | □ | — | — | Malfunction of heat exchanger temperature sensor system | 3–56 |
| | PJ | ◎ | □ | — | — | Failure of capacity setting | 3–59 |

**Symbols and notes**

The table below describes the symbols and notes used in the malfunction overview.

| Symbol / note | Description |
|---|---|
| ◎ | High probability of malfunction |
| ○ | Low probabiltiy of malfunction |
| □ | No possibility of malfunction (do not replace) |

## 1.11 Troubleshooting with the Remote Controller: System Malfunctions

**Malfunction overview**

The table below contains an overview of the system malfunctions.

| If... | Then... | | | | | |
|---|---|---|---|---|---|---|
| Rem. contr. display | Location of the malfunction | | | | Malfunction description | See page |
| | Other than PCB | PCB outd. unit | PCB ind. unit | Rem. contr. | | |
| U0 | ◎ | — | — | — | Gas Shortage Detection (UO) | 3–62 |
| U1 | ◎ | □ | — | — | Reverse Phase (U1) | 3–63 |
| U4 or UF | ◎ | ○ | ○ | — | Transmission Error between Indoor and Outdoor Unit (U4 or UF) | 3–65 |
| U5 | ◎ | — | ○ | ○ | Transmission Error between Indoor Unit and Remote Controller (U5) | 3–67 |
| U8 | ◎ | — | ○ | ○ | Transmission Error between MAIN Remote Controller and SUB Remote Controller (U8) | 3–68 |
| UA | ◎ | — | ○ | — | Malfunctioning Field Setting Switch (UA) | 3–69 |

**Symbols and notes**

The table below describes the symbols and notes used in the malfunction overview.

| Symbol / note | Description |
|---|---|
| ◎ | High probability of malfunction |
| ○ | Low probabiltiy of malfunction |
| □ | No possibility of malfunction (do not replace) |

## 1.12 Overview of the Outdoor Safety Devices

**Overview**

The table below contains an overview of the outdoor safety devices.

| Applicable outdoor unit | Reverse phase protector | Overload contact compressor | Thermal protector fan motor | Overcurrent relay compressor | High-pressure switch | Low-pressure switch |
|---|---|---|---|---|---|---|
| RR71B7V3B | — | — | X | — | X | X |
| RQ71B7V3B | | | | | | |
| RR71B7W1B | X | | | | | |
| RQ71B7W1B | | | | | | |
| RR100B7V3B | — | | | | | |
| RQ100B7V3B | | | | | | |
| RR100B7W1B | X | | | | | |
| RQ100B7W1B | | | | | | |
| RR125B7W1B | | | | | | |
| RQ125B7W1B | | | | | | |

## 1.13 Outdoor Safety Device: Thermal Protector Fan Motor

**Thermal protector fan motor**

The table below describes the thermal protector of the fan motor.

| Applicable outdoor unit | Wiring symbol | Location safety | Settings | | Type |
|---|---|---|---|---|---|
| | | | Abnormal | Reset | Reset |
| RR71B7V3B | Q1M | Outdoor fan motor<br>Q1M connected to X11A<br>Q2M connected to X12A | > 135±5°C | < 95±15°C | Automatic |
| RQ71B7V3B | | | | | |
| RR71B7W1B | | | | | |
| RQ71B7W1B | | | | | |
| RR100B7V3B | | | | | |
| RQ100B7V3B | | | | | |
| RR100B7W1B | | | | | |
| RQ100B7W1B | | | | | |
| RR125B7W1B | Q1M and Q2M | | | | |
| RQ125B7W1B | | | | | |

## 1.14 Outdoor Safety Device: Reverse Phase Protector

**Reverse phase protector**

The table below describes the reverse phase protector.

| Applicable outdoor unit | Wiring symbol | Location safety | Type |
|---|---|---|---|
| | | | Reset |
| RR71B7V3B | No reverse phase protector | | |
| RQ71B7V3B | | | |
| RR71B7W1B | PRC | Switch Box | Automatic and power OFF |
| RQ71B7W1B | | | |
| RR100B7V3B | No reverse phase protector | | |
| RQ100B7V3B | | | |
| RR100B7W1B | PRC | Switch box | Automatic and power OFF |
| RQ100B7W1B | | | |
| RR125B7W1B | | | |
| RQ125B7W1B | | | |

## 1.15 Outdoor Safety Device: High-Pressure Switch

**High-pressure switch**

The table below describes the high-pressure switch.

| Applicable outdoor unit | Wiring symbol | Location safety | Settings | | Type |
|---|---|---|---|---|---|
| | | | Abnormal | Reset | Reset |
| RR71B7V3B | S1PH | Discharge pipe | > 41.5 Bar | < 32 Bar | Automatic |
| RQ71B7V3B | | | | | |
| RR71B7W1B | | | | | |
| RQ71B7W1B | | | | | |
| RR100B7V3B | | | | | |
| RQ100B7V3B | | | | | |
| RR100B7W1B | | | | | |
| RQ100B7W1B | | | | | |
| RR125B7W1B | | | | | |
| RQ125B7W1B | | | | | |

## 1.16 Outdoor Safety Device: Low-Pressure Switch

**Low-pressure switch**

The table below describes the low-pressure switch.

| Applicable outdoor unit | Wiring symbol | Location safety | Settings | | Type |
|---|---|---|---|---|---|
| | | | Abnormal | Reset | Reset |
| RR71B7V3B | S1LP | Low-pressure switch located in suction pipe | < -0.3 bar | > +0.5 bar | Automatic |
| RQ71B7V3B | | | | | |
| RR71B7W1B | | | | | |
| RQ71B7W1B | | | | | |
| RR100B7V3B | | | | | |
| RQ100B7V3B | | | | | |
| RR100B7W1B | | | | | |
| RQ100B7W1B | | | | | |
| RR125B7W1B | | | | | |
| RQ125B7W1B | | | | | |

3

# 2 Error Codes: Indoor Units

## 2.1 What Is in This Chapter?

**Introduction**

In the first stage of the troubleshooting sequence, it is important to correctly interpret the error code on the remote controller display. The error code helps you to find the cause of the problem.

**Shutdown**

For some errors, the system only shuts down when the error occurs several times. This means that you have to wait until the system shuts down to be able to see the flashing LED on the front panel and the error code on the remote controller.

**Overview**

This chapter contains the following topics:

## 2.2 Malfunctioning Indoor PCB (A1)

**Error code**

A1

**LED indications**

The table below shows the LED indications.

| Operation | HAP (green) | HBP (green) |
|---|---|---|
| Normal | ◑ | ◑ |
| Malfunctioning | ◑ | ☼ |
| | ◑ | ● |
| | ☼ | — |
| | ● | — |

**Error generation**

The error is generated when the data from the EEPROM is not received correctly.

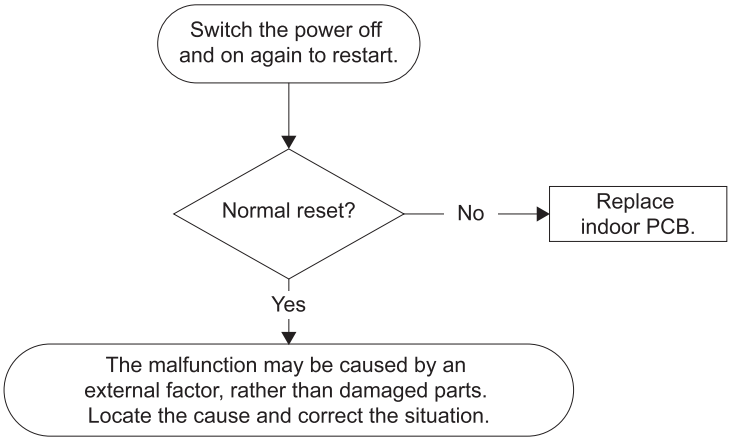
EEPROM (Electrically Erasable Programmable Read Only Memory): A memory chip that holds its content without power. It can be erased, either within the computer or externally and usually requires more voltage for erasure than the common +5 volts used in logic circuits. It functions like non-volatile RAM, but writing to EEPROM is slower than writing to RAM.

**Causes**

The possible cause is a malfunctioning indoor PCB.

**Troubleshooting**

To troubleshoot, proceed as follows:




**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

## 2.3 Malfunctioning Drain Water Level System (A3)

**Error code**

A3

**LED indications**

The table below shows the LED indications.

| Operation | HAP (green) | HBP (green) |
|---|---|---|
| Normal | ☼ | ☼ |
| Malfunctioning | ☼ | ☼ |

**Error generation**

The error is generated when the water level reaches its upper limit and when the float switch turns OFF.

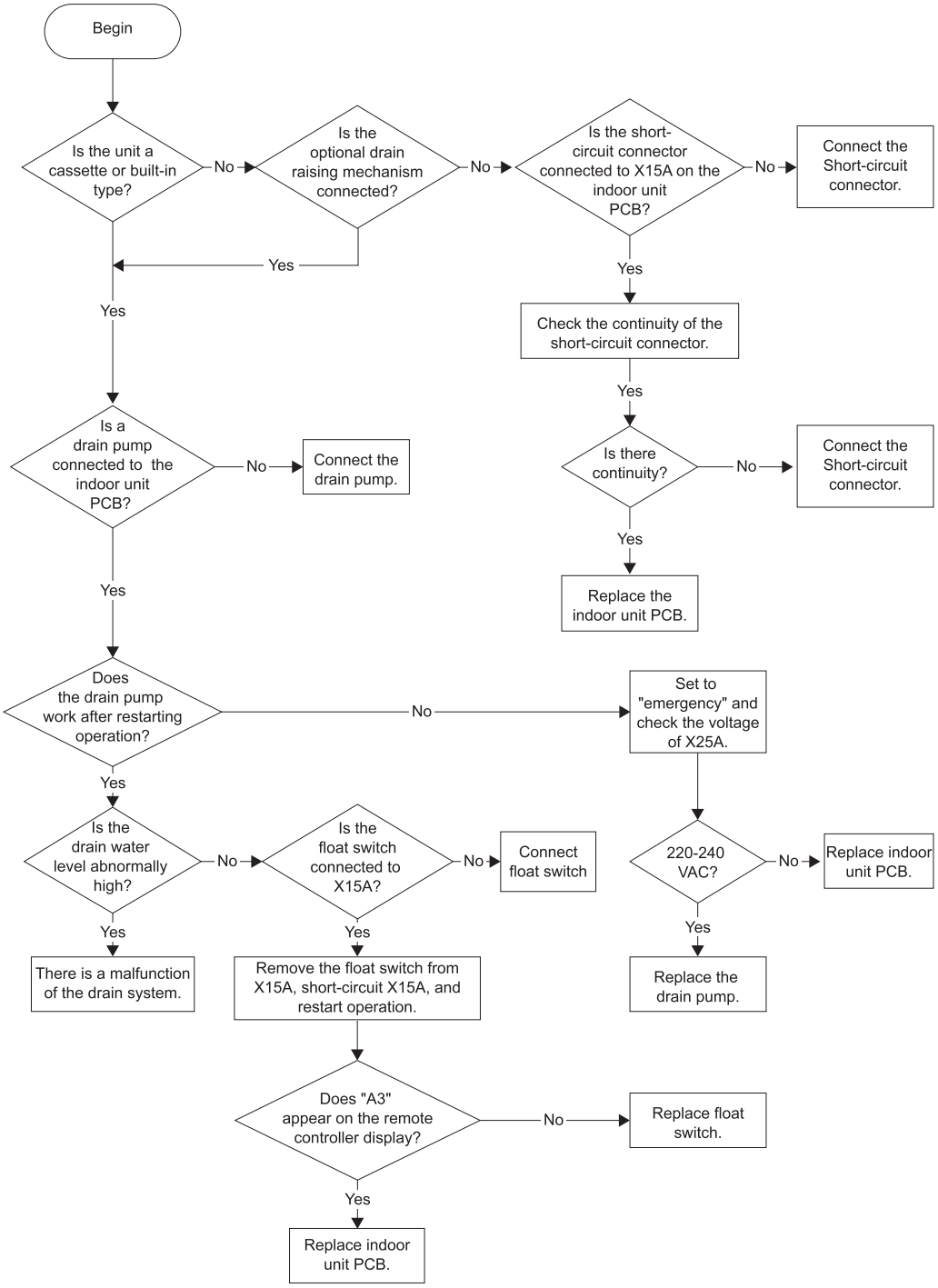
**Causes**

The possible causes are:

- ➤ Malfunctioning drain pump
- ➤ Improper drain piping work
- ➤ Drain piping clogging
- ➤ Malfunctioning float switch
- ➤ Malfunctioning indoor unit PCB
- ➤ Malfunctioning short-circuit connector X15 on PCB.

**Troubleshooting**

To troubleshoot, proceed as follows:




**Remark**

If "A3" is detected by a PC board which is not mounted with X15A, the PC board is defective.

**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

## 2.4 Indoor Unit Fan Motor Lock (A6)

**Error code**

A6

**LED indications**

The table below shows the LED indications.

| Operation | HAP (green) | HBP (green) |
|---|---|---|
| Normal | ☼ | ☼ |
| Malfunctioning | ☼ | ☼ |

**Error generation**

The error is generated when the fan rotations are not detected while the output voltage to the fan is at its maximum.

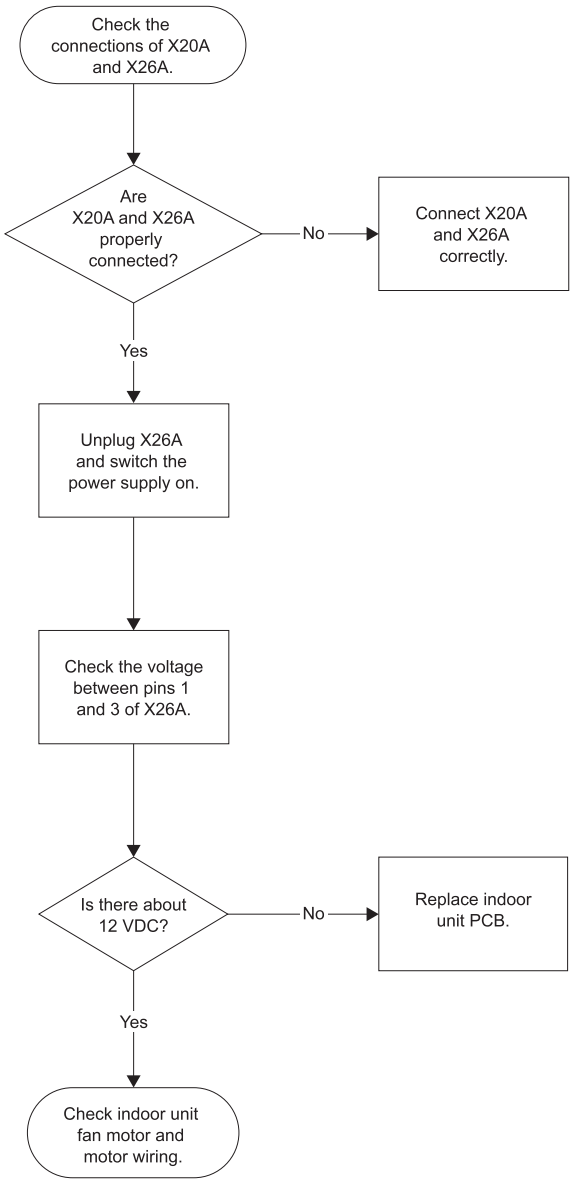
**Causes**

The possible causes are:

- ➤ Malfunctioning indoor unit fan motor
- ➤ Broken or disconnected wire
- ➤ Malfunctioning contact
- ➤ Malfunctioning indoor unit PCB.

**Troubleshooting**

To troubleshoot, proceed as follows:




**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

## 2.5 Malfunctioning Drain System (AF)

**Error code**

AF

**LED indications**

The table below shows the LED indications.

| Operation | HAP (green) | HBP (green) |
|---|---|---|
| Normal | ☼ | ☼ |
| Malfunctioning | ☼ | ☼ |

**Error generation**

The error is generated when the float switch changes from ON to OFF while the compressor is OFF.

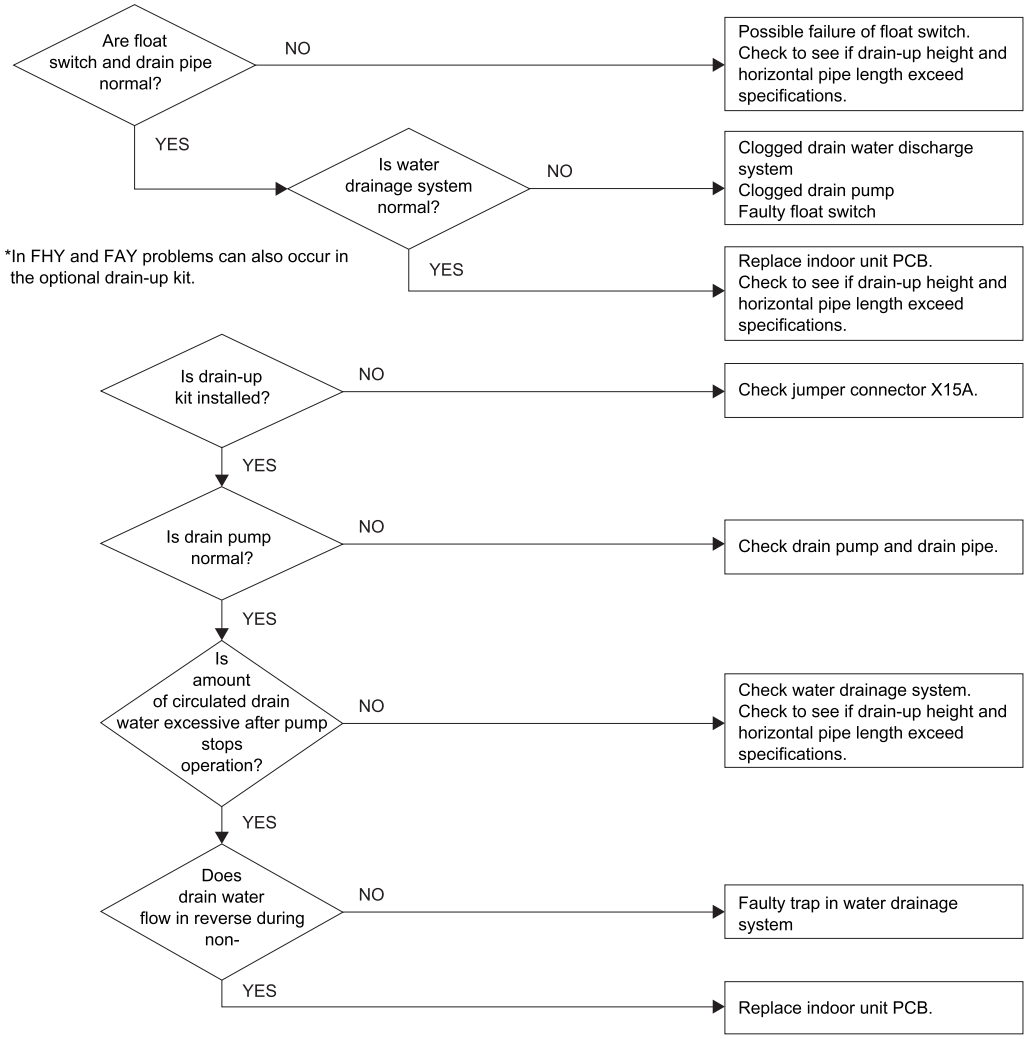
**Causes**

The possible causes are:

- ➤ Error in the drain pipe installation
- ➤ Malfunctioning float switch
- ➤ Malfunctioning indoor unit PCB.

**Troubleshooting**

To troubleshoot, proceed as follows:




**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

## 2.6 Malfunctioning Capacity Setting (RJ)

**Error code**

RJ

**LED indications**

The table below shows the LED indications.

| Operation | HAP (green) | HBP (green) |
|---|---|---|
| Normal | ☼ | ☼ |
| Malfunctioning | ☼ | ☼ |

3

**Error generation**

The error is generated when the following conditions are fulfilled:

| Condition | Description |
|---|---|
| 1 | ➤ The unit is in operation.<br>➤ The PCB's memory IC does not contain the capacity code.<br>➤ The capacity setting adaptor is not connected. |
| 2 | ➤ The unit is in operation.<br>➤ The capacity that is set, does not exist for that unit. |

**Causes**

The possible causes are:

- ➤ Malfunctioning capacity setting adaptor connection
- ➤ Malfunctioning indoor unit PCB.

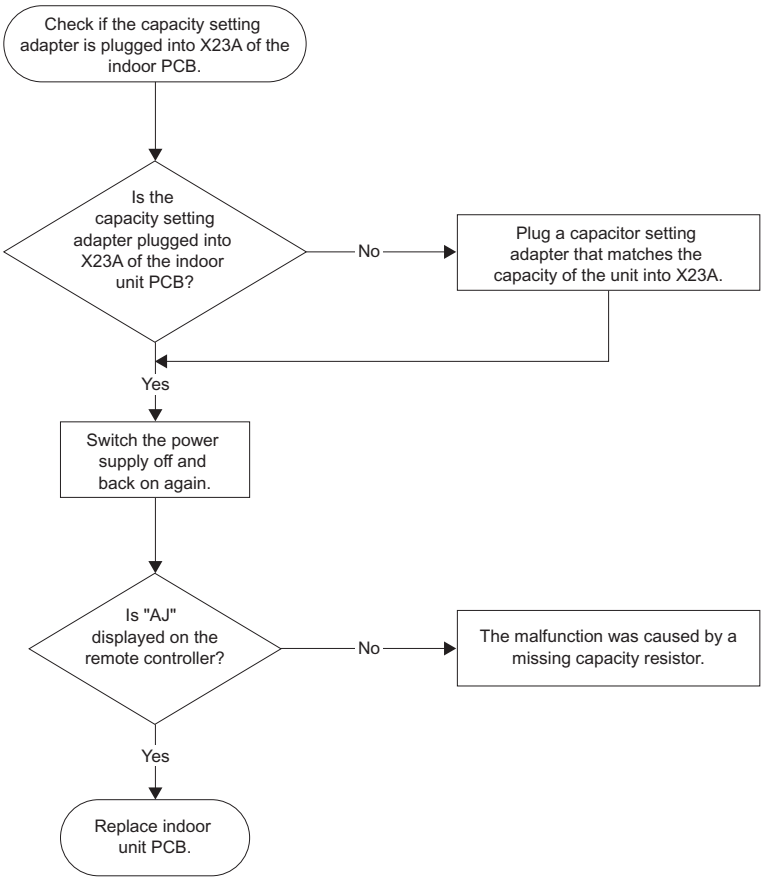
**Capacity setting adaptor**

The capacity is set in the PCB's memory IC. A capacity setting adaptor that matches the capacity of the unit is required in the following case:

In case the indoor PCB installed at the factory is for some reason changed at the installation site, the capacity will not be contained in the replacement PCB. To set the correct capacity for the PCB you have to connect a capacity setting adaptor with the correct capacity setting to the PCB. The capacity setting for the PCB will become the capacity setting of the adaptor because the capacity setting adaptor has priority.

**Troubleshooting**

To troubleshoot, proceed as follows:




**Caution**

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

## 2.7 Thermistor Abnormality (C4 or C9)

**Error code**

The table below describes the two thermistor abnormalities.

| Error | Description |
|---|---|
| C4 | Malfunctioning heat exchanger thermistor system. |
| C9 | Malfunctioning suction air thermistor system. |

**LED indications**

The table below shows the LED indications.

| Operation | HAP (green) | HBP (green) |
|---|---|---|
| Normal | ☼ | ☼ |
| Malfunctioning | ☼ | ☼ |

**Error generation**

The error is generated when during compressor operation:

- ➤ Thermistor input > 4.96 V, or
- ➤ Thermistor output < 0.04 V.

**Causes**

The possible causes are:

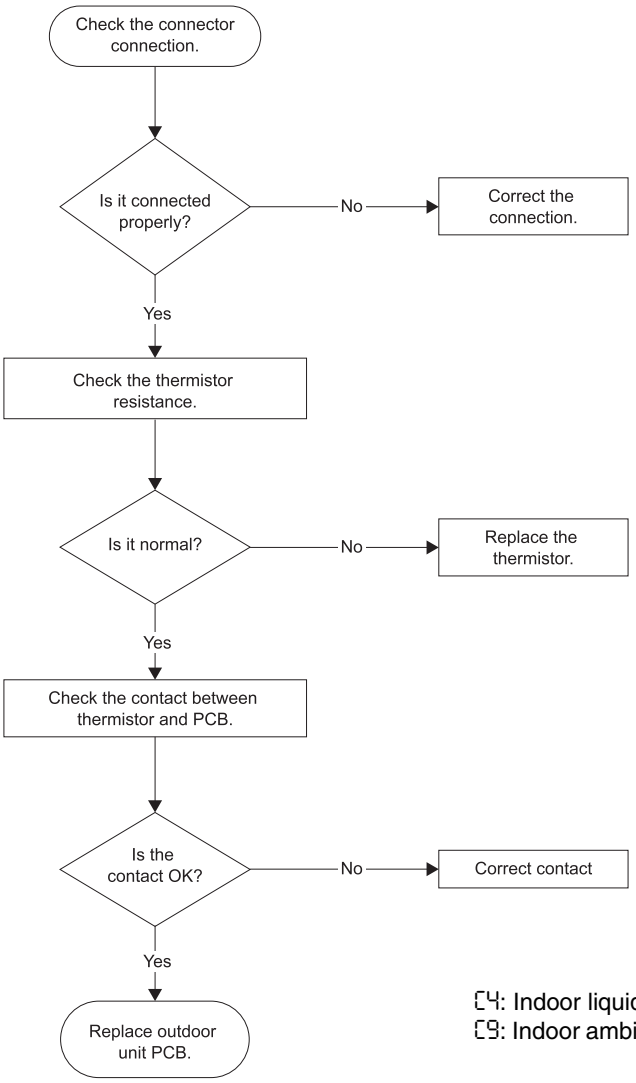
- ➤ Malfunctioning connector connection
- ➤ Malfunctioning thermistor
- ➤ Malfunctioning PCB
- ➤ Broken or disconnected wire.

**Checking thermistors**

See page 3–76.

**Troubleshooting**

To troubleshoot, proceed as follows:




C4: Indoor liquid pipe thermistor (R2T).
C9: Indoor ambient temperature thermistor (R1T).

**Caution**

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

## 2.8 Malfunctioning Remote Controller Air Thermistor (CJ)

**Error code**

CJ

**LED indications**

The table below shows the LED indications.

| Operation | HAP (green) | HBP (green) |
|---|---|---|
| Normal | ☼ | ☼ |
| Malfunctioning | ☼ | ☼ |

3

**Error generation**

The error is generated when the remote controller thermistor becomes disconnected or shorted while the unit is running.

Even if the remote controller thermistor is malfunctioning, the system can operate with the system thermistor.

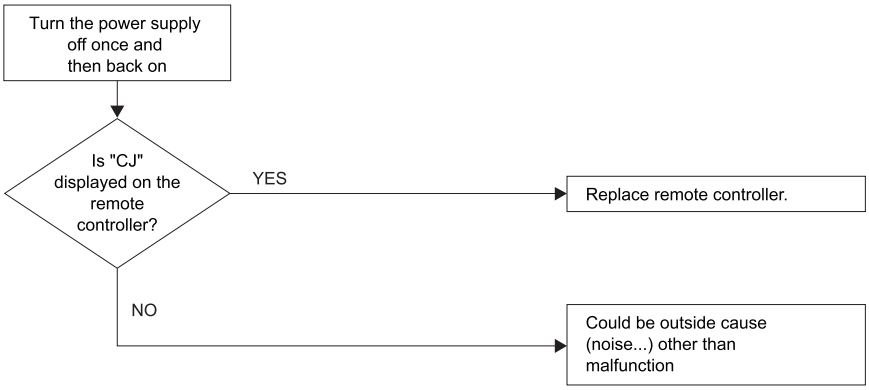
**Causes**

The possible causes are:

- ➤ Malfunctioning thermistor
- ➤ Broken wire.

**Troubleshooting**

To troubleshoot, proceed as follows:




**Caution**

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

# 3 Error Codes: Outdoor Units

## 3.1 What Is in This Chapter?

**Introduction**

In the first stage of the troubleshooting sequence, it is important to correctly interpret the error code on the remote controller display. The error code helps you to find the cause of the problem.



**Overview**

This chapter contains the following topics:

## 3.2 Activation of Safety Device (E0)

**Error code**

E0

**Error generation**

The error is generated when a safety device has detected an abnormality.

**Causes**

The possible causes are:

- ➤ Malfunctioning safety device input connection
- ➤ Broken or disconnected safety device harness
- ➤ Clogging refrigerant piping circuit
- ➤ Air short-circuit
- ➤ Malfunctioning outdoor PCB.

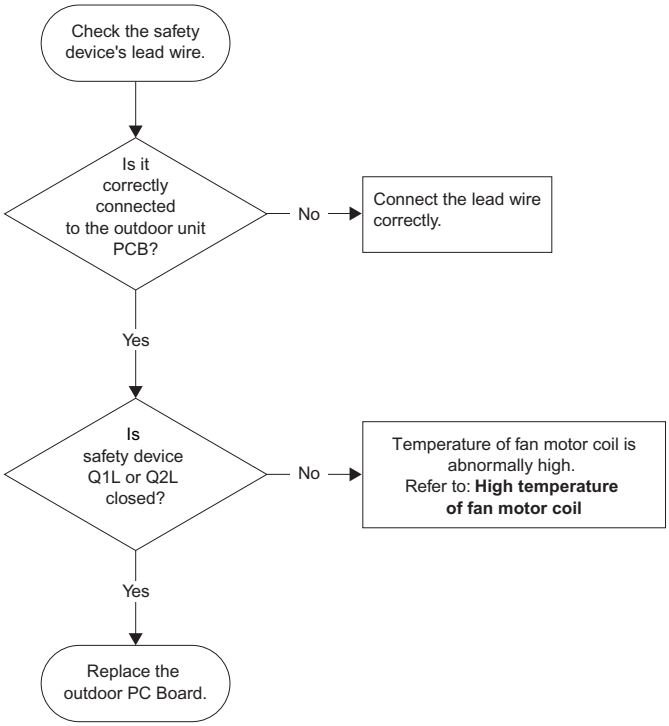
3

**Overview outdoor safety devices**

See page 3–19.

**Troubleshooting**

To troubleshoot, proceed as follows:

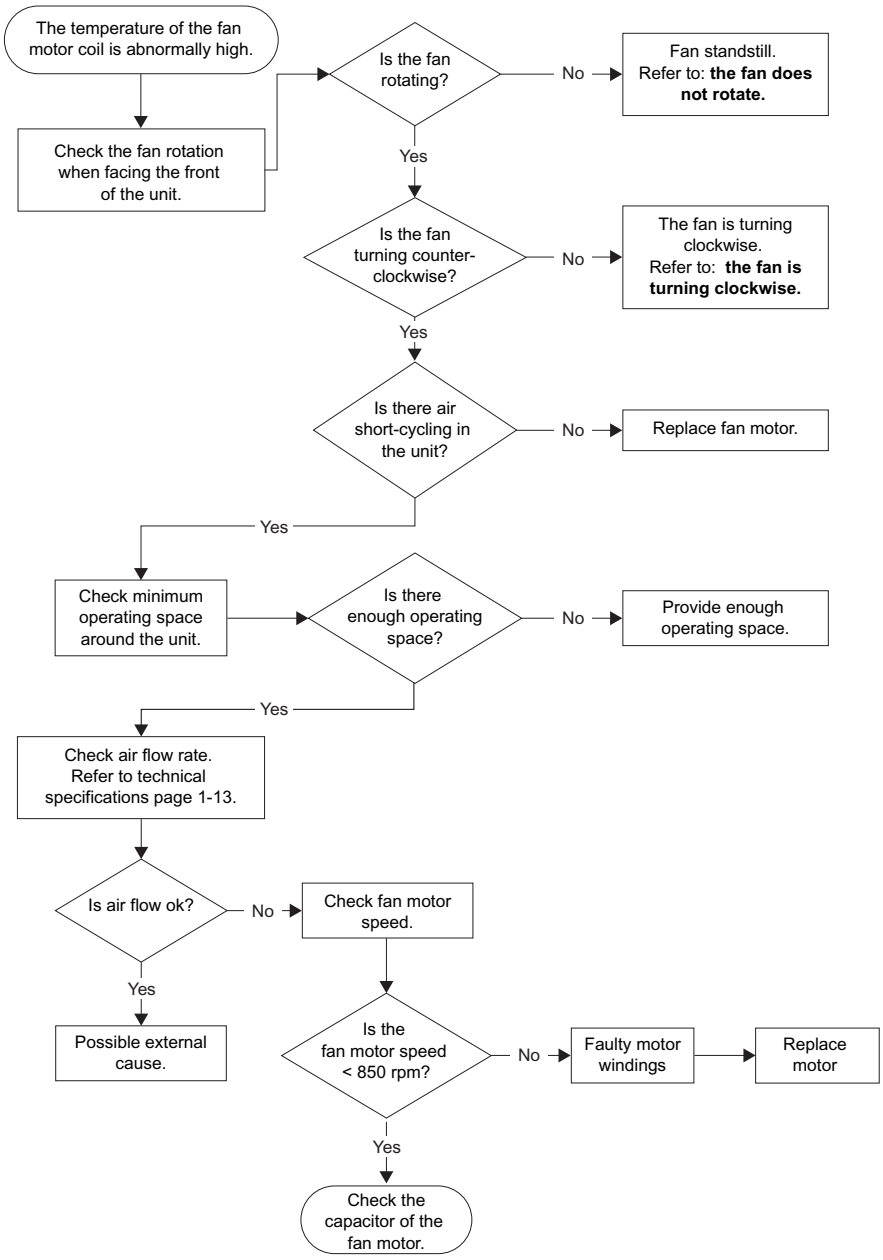



**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

**High temperature of fan motor coil**

To troubleshoot, proceed as follows:

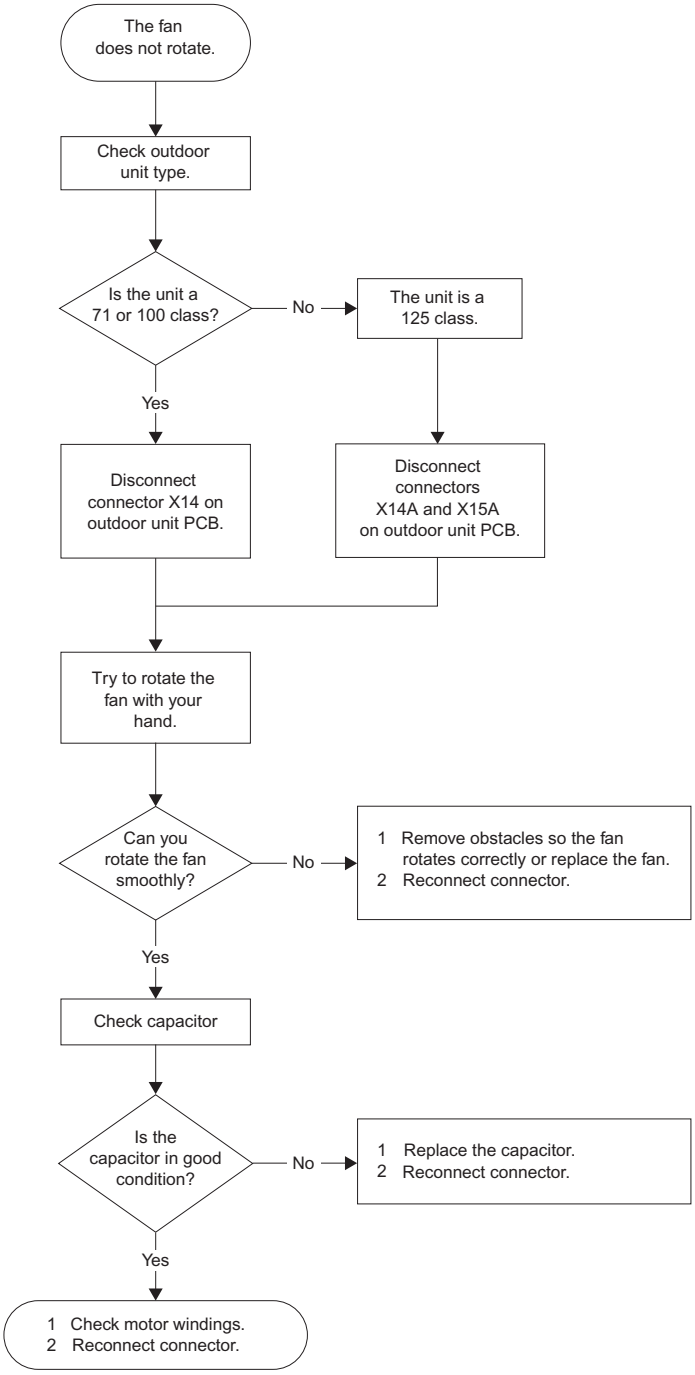



**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

**The fan does not rotate**

To troubleshoot, proceed as follows:

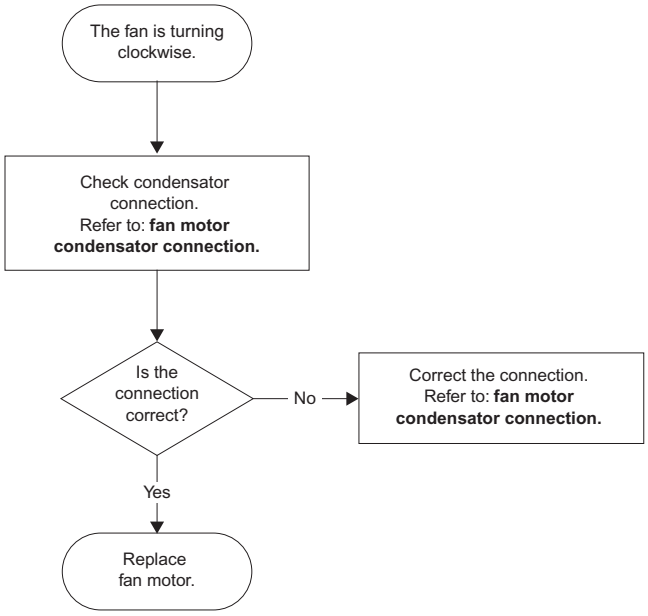



**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

**The fan is turning clockwise**

To troubleshoot, proceed as follows:




**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

## 3.3 Failure of Outdoor Unit PC Board (E1)

**Remote Controller Display**

E1

**Method of Malfunction Detection**

A microcomputer checks whether or not $E^2$PROM is normal.

**Malfunction Decision Conditions**

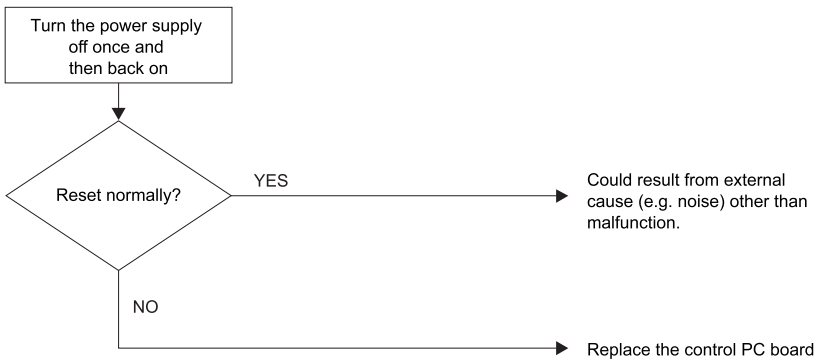
The $E^2$PROM is malfunctioning when the power supply is turned on.

3

**Possible Causes**

➤ Faulty outdoor unit PC board

**Troubleshooting**




**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

## 3.4 Abnormal High Pressure (Detected by the HPS) (E3)

**Error code**

E3

**Error generation**

The error is generated when the high-pressure switch is activated during compressor operation.

**Causes**

The possible causes are:

- ➤ Abnormal high pressure caused by too much refrigerant or by non-condensable gas (air or nitrogen)
- ➤ Inaccuracy of the high-pressure switch
- ➤ Broken or disconnected high-pressure switch harness
- ➤ Malfunctioning high-pressure switch connector connection
- ➤ Malfunctioning outdoor unit PCB
- ➤ Malfunctioning refrigerant piping circuit
- ➤ Indoor unit air filter is clogged (Heat mode)
- ➤ Outdoor heat exchanger dirty (Cool mode)
- ➤ Outdoor fan malfunction (Cool mode)
- ➤ Stop valves are not opened

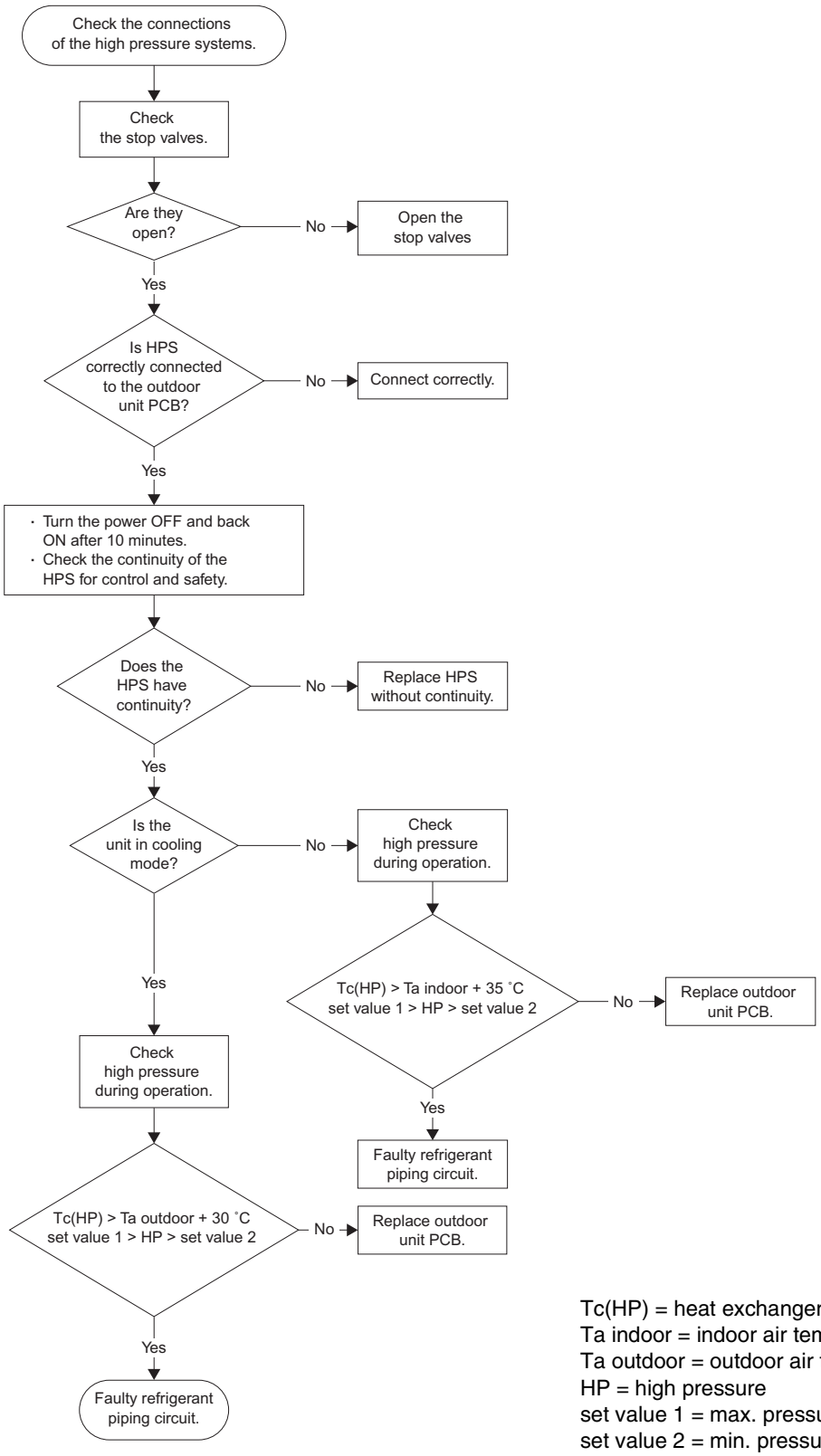
**HPS settings**

The table below contains the preset HPS values.

| Applicable units | Abnormal | Reset |
|---|---|---|
| RR/RQ71~125B | > 41.5 bar | < 32 bar |

**Troubleshooting**

To troubleshoot, proceed as follows:




Tc(HP) = heat exchanger temp.
Ta indoor = indoor air temp.
Ta outdoor = outdoor air temp.
HP = high pressure
set value 1 = max. pressure
set value 2 = min. pressure
Refer to high pressure settings

**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

## 3.5 Abnormal Low Pressure (Detected by the LPS) (E4)

**Error code**

E4

**Error generation**

The error is generated when the low-pressure switch is activated during compressor operation.

**Causes**

The possible causes are:

- ➤ Malfunctioning refrigerant piping circuit
- ➤ Malfunctioning low-pressure switch
- ➤ Disconnected or broken low-pressure switch harness
- ➤ Malfunctioning low-pressure switch connector connection
- ➤ Malfunctioning outdoor unit PCB.
- ➤ Stop valves are not opened

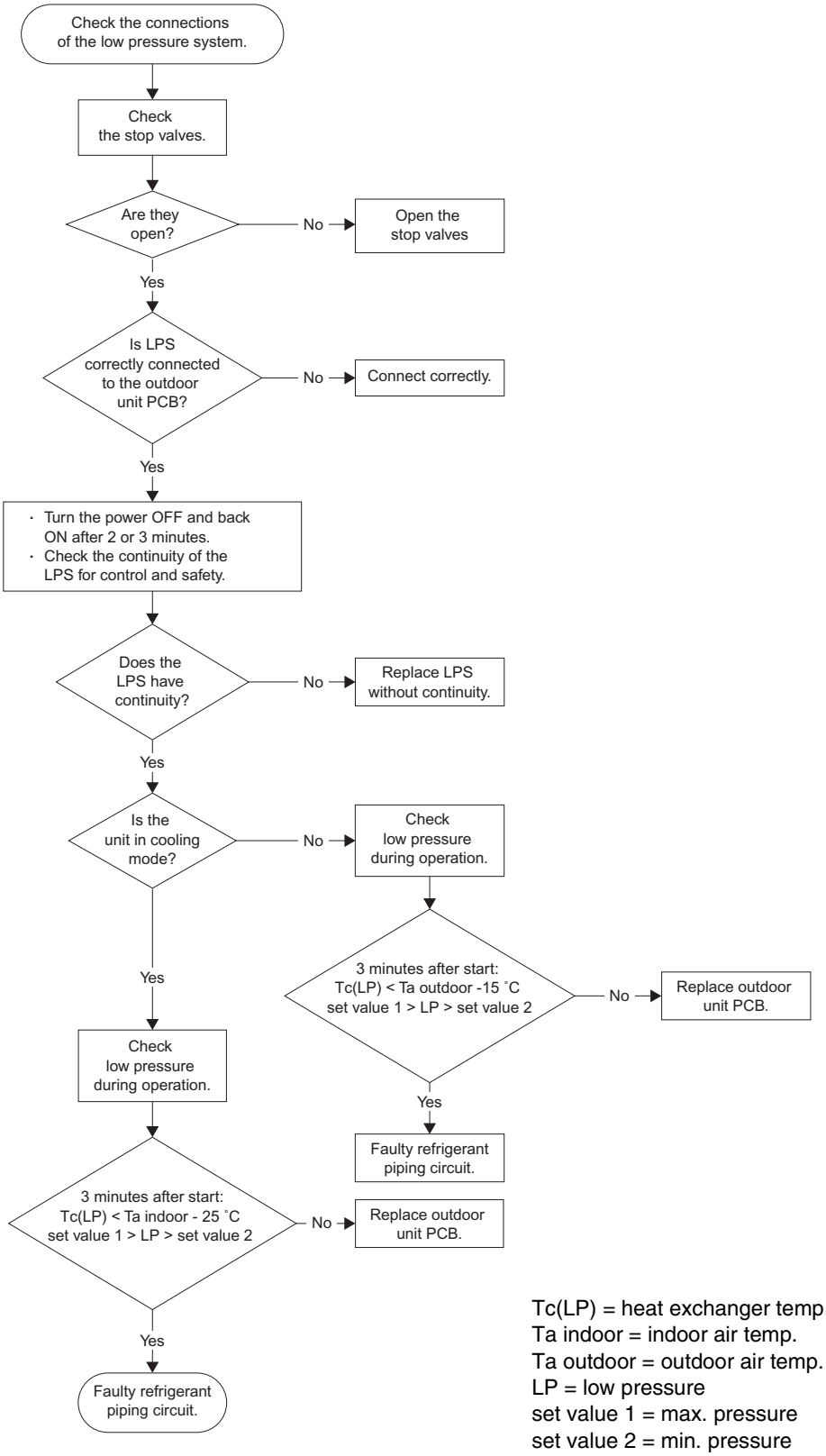
**LPS settings**

The table below contains the preset LPS values.

| Applicable units | Abnormal | Reset |
|---|---|---|
| RR/RQ71~125B | < -0.3 bar | > +0.5 bar |

**Troubleshooting**

To troubleshoot, proceed as follows:




Tc(LP) = heat exchanger temp.
Ta indoor = indoor air temp.
Ta outdoor = outdoor air temp.
LP = low pressure
set value 1 = max. pressure
set value 2 = min. pressure
Refer to low pressure settings

**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

## 3.6 Compressor Overcurrent (E6)

**Remote Controller Display**

E6

**Method of Malfunction Detection**

The input current value is detected with a current sensor.

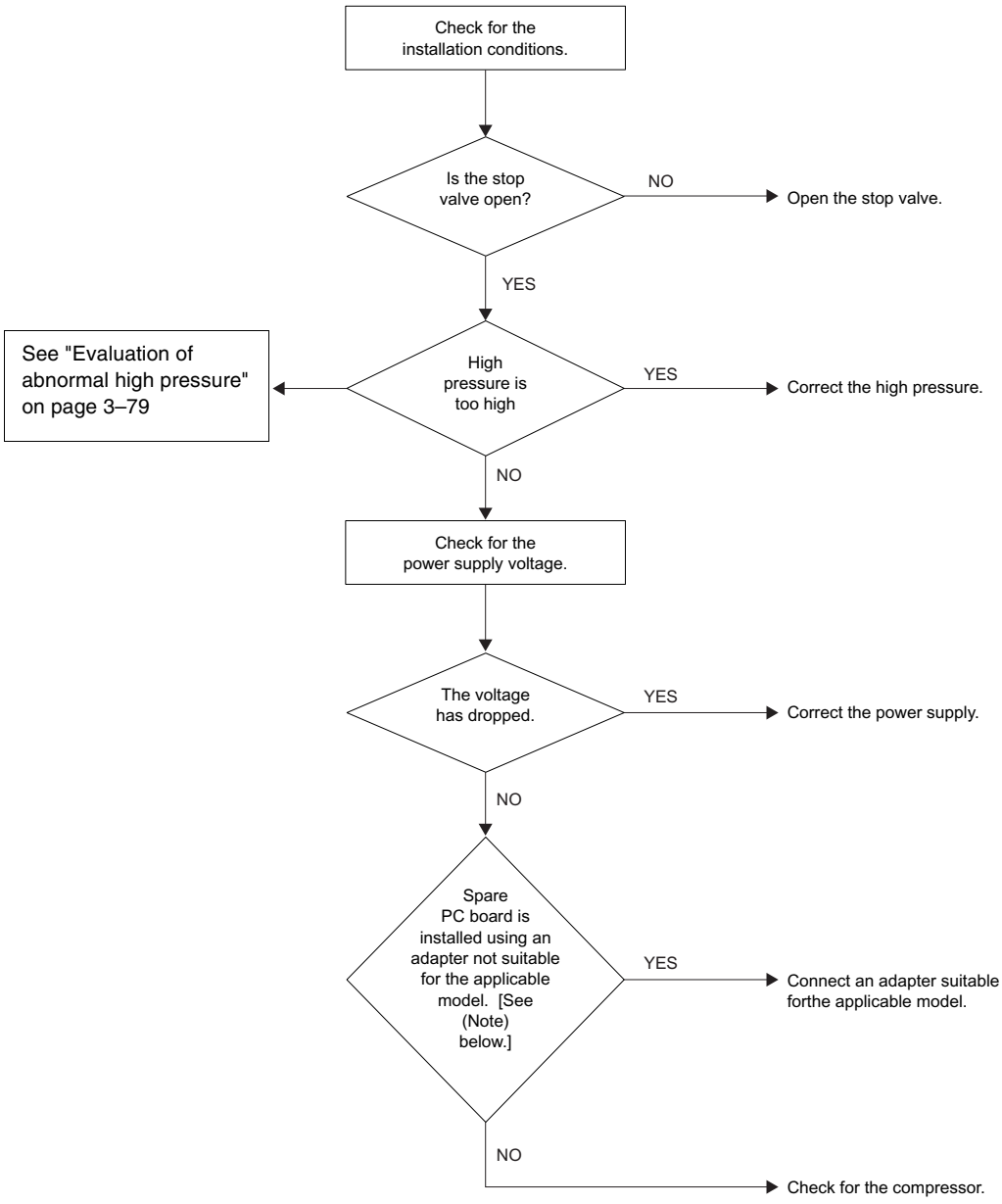
**Malfunction Decision Conditions**

When the compressor input current exceeds the specified input current value.
Refer "Approximate Input current value" on next page.

**Possible Causes**

- ➤ High pressure increased too high
- ➤ Voltage drop
- ➤ Stop valves are not opened
- ➤ Faulty compressor (compressor lock)

**Troubleshooting**




**Caution** Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

**Note** For details, refer to information in Section "Failure of PJ Capacity Setting".

Approximate Input current value:

| | | Input current value |
|---|---|---|
| RQ(RR)71B7V3B | JT90G-V1N | 25.3 |
| RQ(RR)71B7W1B | JT90G-YE | 11.5 |
| RQ(RR)100B7V3B | JT125G-V1N | 38.0 |
| RQ(RR)100B7W1B | JT125G-YE | 11.5 |
| RQ(RR)125B7W1B | JT160G-YE | 15.0 |

## 3.7 Malfunctioning Electronic Expansion Valve (E9)

**Error code**

E9

**Error generation**

The error is generated when the following coil current condition is not met:

Open circuit < coil current < short circuit.

**Resistance values**

The table below contains the reference resistance values.

| — | Grey | Black | Yellow | Red | Orange |
|---|---|---|---|---|---|
| **Grey** | — | 40-50 Ω | 40-50 Ω | 40-50 Ω | 40-50 Ω |
| **Black** | 40-50 Ω | — | 80-100 Ω | 80-100 Ω | 80-100 Ω |
| **Yellow** | 40-50 Ω | 80-100 Ω | — | 80-100 Ω | 80-100 Ω |
| **Red** | 40-50 Ω | 80-100 Ω | 80-100 Ω | — | 80-100 Ω |
| **Orange** | 40-50 Ω | 80-100 Ω | 80-100 Ω | 80-100 Ω | — |

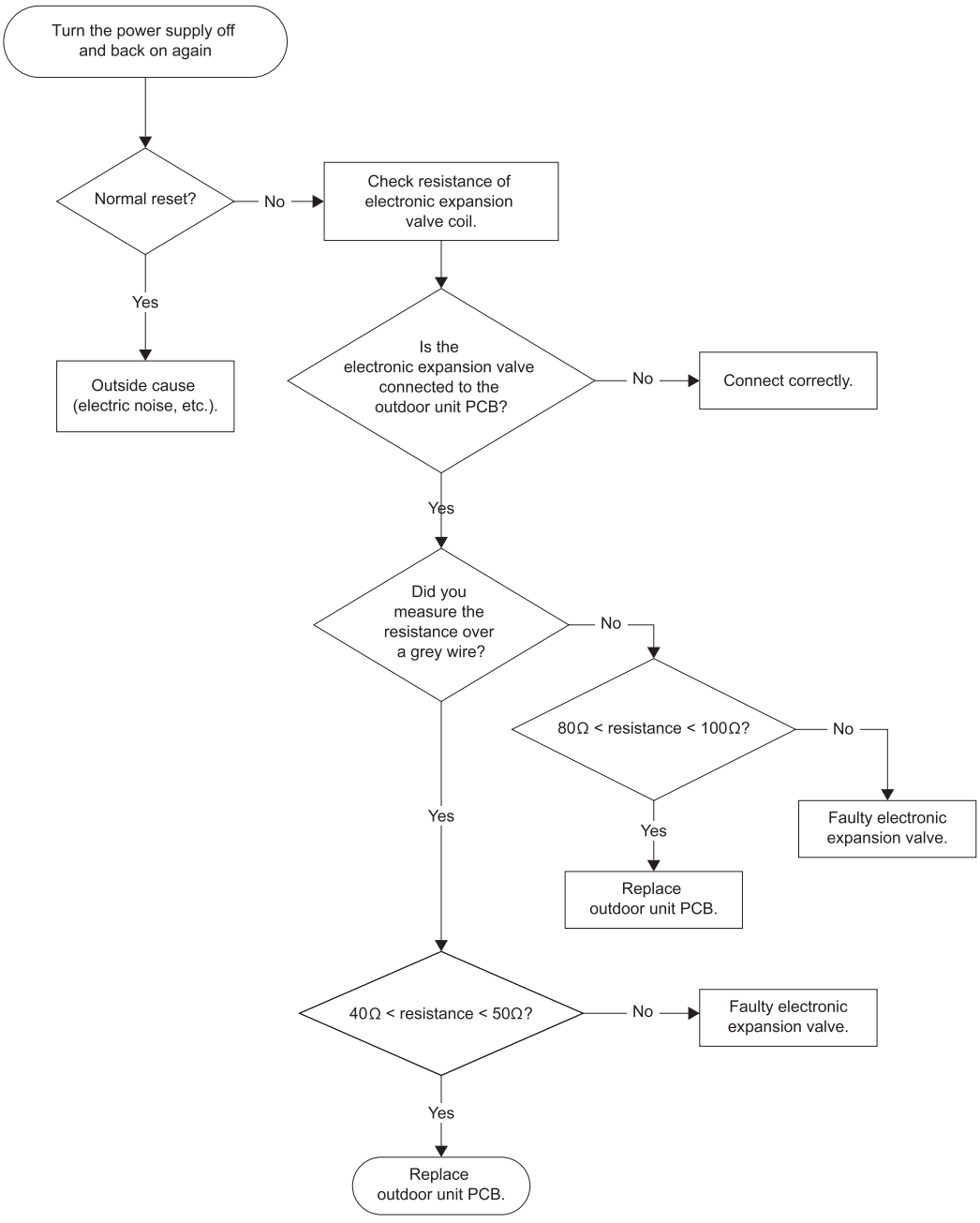
**Causes**

The possible causes are:

- ➤ Malfunctioning electronic expansion valve
- ➤ Broken or disconnected electronic expansion valve harness
- ➤ Malfunctioning electronic expansion valve connector connection
- ➤ Malfunctioning outdoor unit PCB
- ➤ Outside cause (electric noise...).

**Troubleshooting**

To troubleshoot, proceed as follows:




**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

## 3.8 Malfunctioning in Discharge Pipe Temperature (F3)

**Error code**

F3

**Error generation**

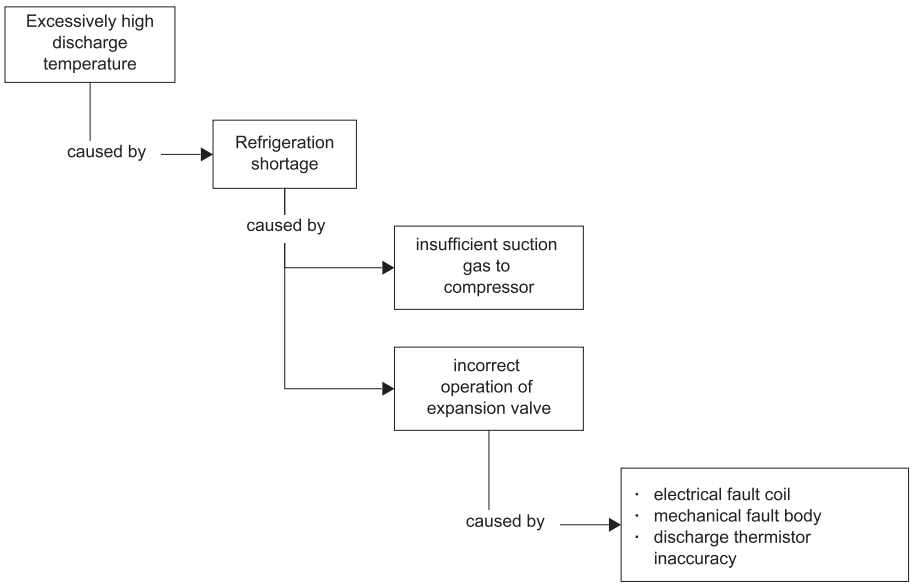
The error is generated when:

- ➤ Discharge pipe temperature becomes abnormally high
- ➤ Discharge pipe temperature rises suddenly
- ➤ Discharge pipe thermistor is not in its holder.

**Causes**

The possible causes are:

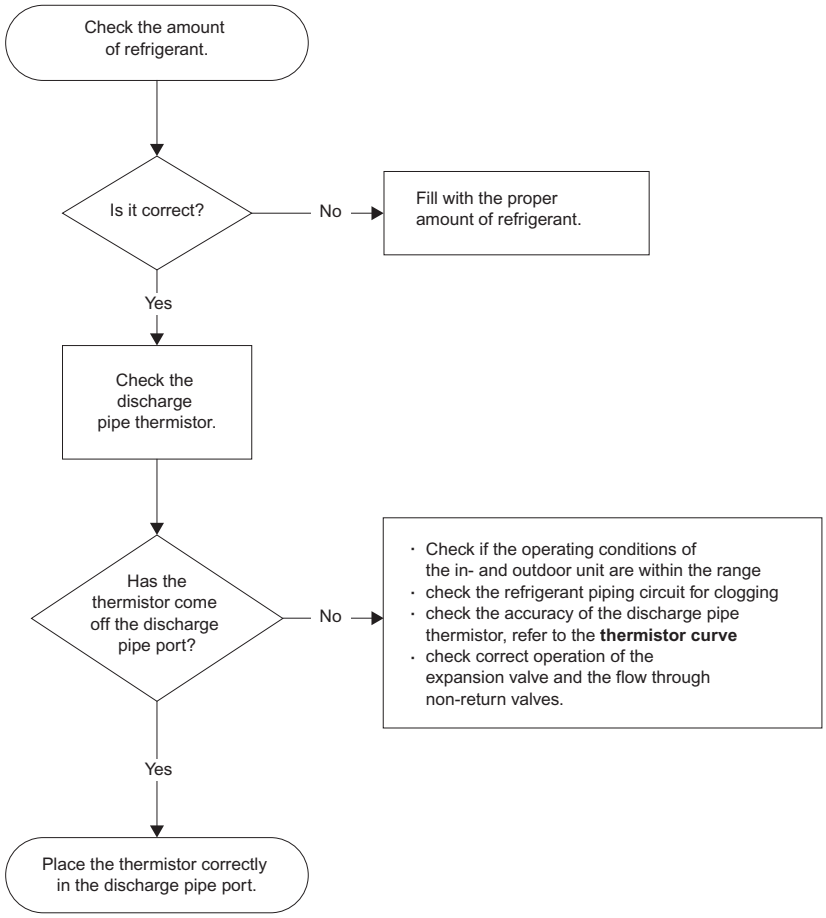
- ➤ Improper refrigerant amount
- ➤ Clogging refrigerant piping circuit
- ➤ Discharge temperature that is too low due to too much refrigerant or due to the discharge thermistor being out of its holder
- ➤ Electronic expansion valve coil is disconnected from valve body
- ➤ Discharge temperature that is too high. The possible causes are:




3

**Troubleshooting**

To troubleshoot, proceed as follows:




**Thermistor curve**

See page 3–78.

**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

## 3.9 Malfunctioning HPS (H3)

**Error code**

H3

**Error generation**

The error is generated when there is no continuity in the high-pressure switch during compressor OFF.

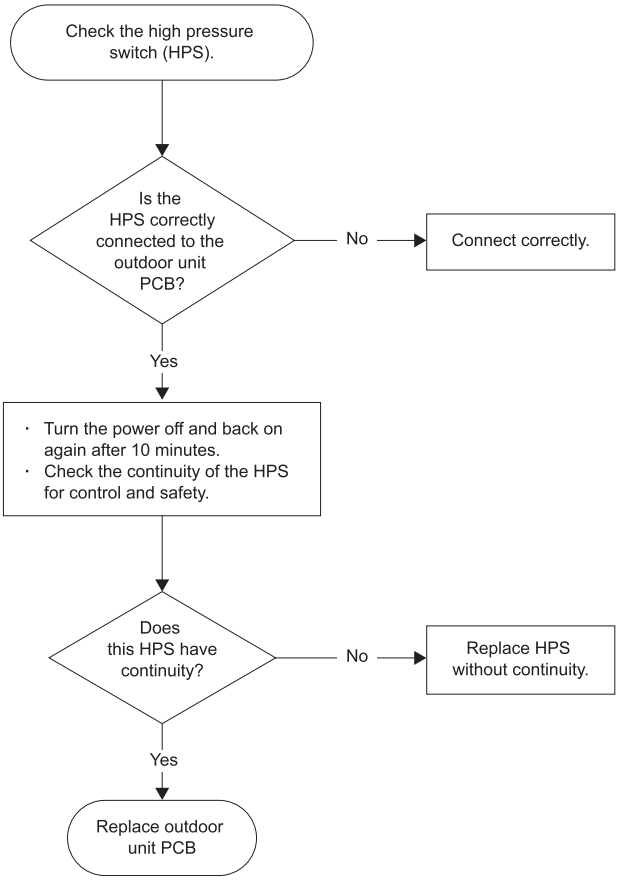
**Causes**

The possible causes are:

- ➤ Malfunctioning high-pressure switch
- ➤ Broken or disconnected high-pressure switch harness
- ➤ Malfunctioning high-pressure switch connector connection
- ➤ Malfunctioning outdoor unit PCB.

**Troubleshooting**

To troubleshoot, proceed as follows:




**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

## 3.10 Malfunctioning Outdoor Thermistor System (H9)

**Error code**

H9

**Error generation**

The error is generated when the thermistor resistance is out of its range (60Ω to 600kΩ).

**Causes**

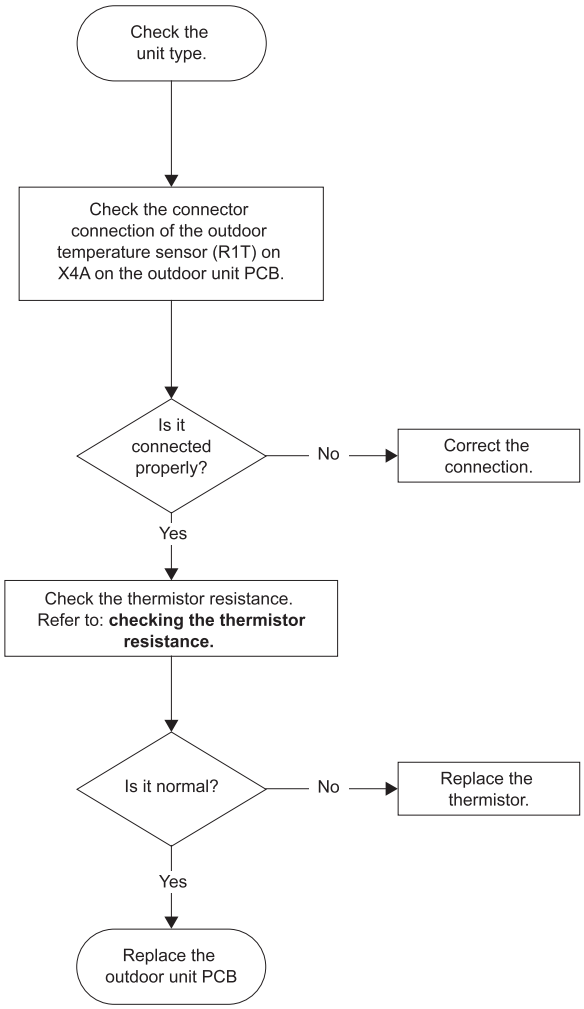
The possible causes are:

- ➤ Malfunctioning outdoor thermistor
- ➤ Malfunctioning outdoor thermistor connector connection
- ➤ Malfunctioning outdoor unit PCB.

3

**Troubleshooting**

To troubleshoot, proceed as follows:




**Checking the thermistor resistance**

See page 3–77.

**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

## 3.11 Malfunctioning Discharge Pipe Thermistor System (J3)

**Error code**

J3

**Error generation**

The error is generated when the thermistor resistance is out of its range.

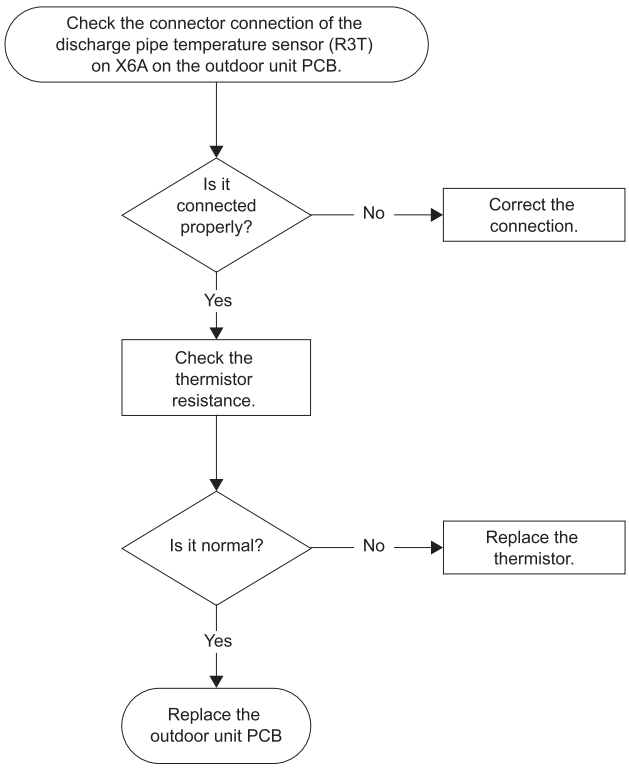
**Causes**

The possible causes are:

- ➤ Malfunctioning discharge pipe thermistor
- ➤ Malfunctioning discharge pipe thermistor connector connection
- ➤ Malfunctioning outdoor unit PCB.

**Troubleshooting**

To troubleshoot, proceed as follows:




**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

## 3.12 Malfunctioning Heat Exchanger Thermistor System (J6)

**Error code**

J6

**Error generation**

The error is generated when the thermistor resistance is out of its range.

**Causes**

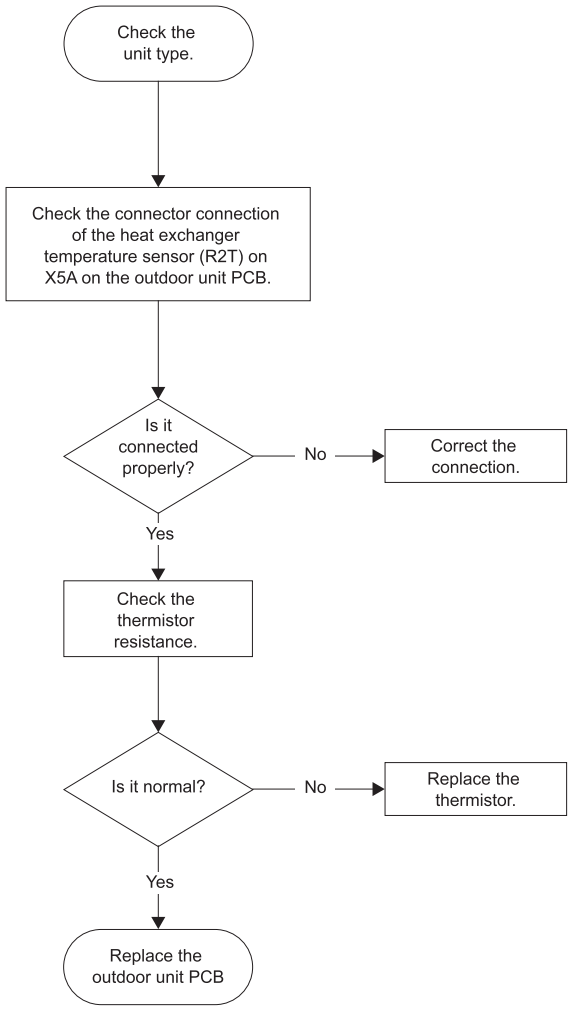
The possible causes are:

- ➤ Malfunctioning heat exchanger thermistor
- ➤ Malfunctioning heat exchanger thermistor connector connection
- ➤ Malfunctioning outdoor unit PCB.

3

**Troubleshooting**

To troubleshoot, proceed as follows:




**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

## 3.13 Malfunction of Current Sensor System (J2)

**Remote Controller Display**

J2

**Method of Malfunction Detection**

The malfunction of current sensor is detected through the current detected with the current sensor.

**Malfunction Decision Conditions**

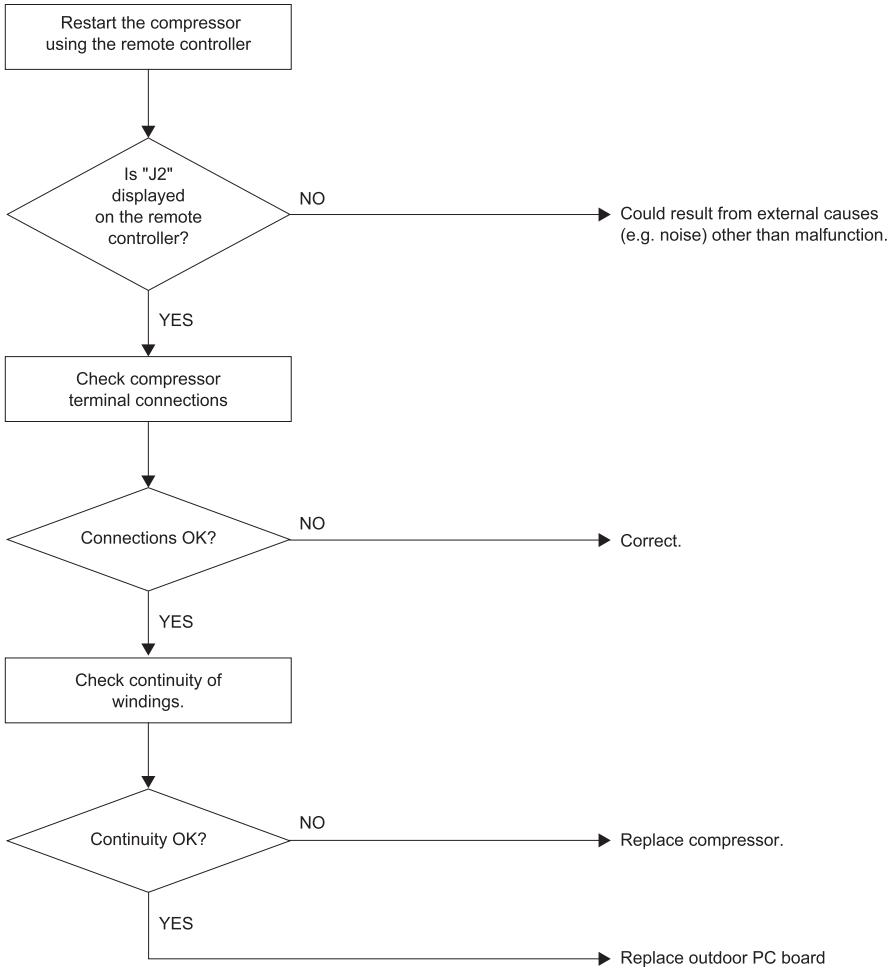
**While in operation:**
When the current detected with the current sensor is not more than a constant value.

**While in stopping:**
When the current detected with the current sensor is not less than a constant value.

**Possible Causes**

- Faulty current sensor
- Faulty outdoor unit PC board
- Disconnected compressor

**Troubleshooting**



**Caution** Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

## 3.14 Failure of Capacity Setting (PJ)

**Remote Controller Display**

PJ

**Method of Malfunction Detection**

Check whether set value (i.e., factory set value) written in $E^2$PROM or set value with the (replaced) capacity setting adaptor (X26A) is the same as that of outdoor unit capacity.

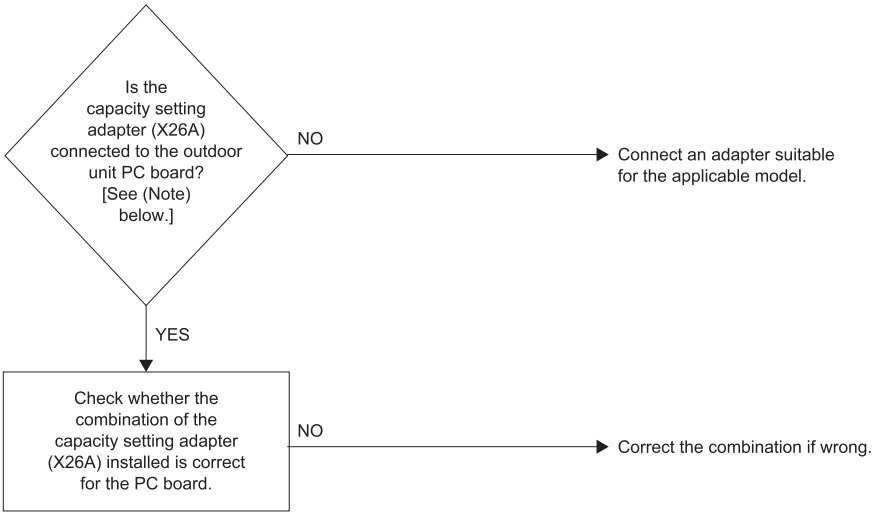
**Malfunction Decision Conditions**

When the set value with the $E^2$PROM differs from that of the outdoor unit capacity or any capacity setting adaptor other than that suitable for the applicable PC board is installed. (However, the failure decision is made only when the power supply is turned on.)

**Possible Causes**

- Improper set value with $E^2$PROM
- Improper capacity setting adaptor installed
- Faulty outdoor unit PC board

**Troubleshooting**




**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

**Notes**

- The capacity setting adaptor is not connected at the time of shipment from factory. (The capacity is written in the $E^2$PROM.) This capacity setting adaptor is required only when the PC board is replaced with a spare PC board.
- Refer to instructions on how to set Spare Part outdoor PC board on page 4-18.

3

# 4 Error Codes: System Malfunctions

## 4.1 What Is in This Chapter?

**Introduction**

In the first stage of the troubleshooting sequence, it is important to correctly interpret the error code on the remote controller display. The error code helps you to find the cause of the problem.



**Overview**

This chapter contains the following topics:

## 4.2 Gas Shortage Detection (U0)

**Error code**

U0

**Error method**

The discharge pipe thermistor detects the malfunction temperature at which there can be a gas shortage. If the discharge temperature exceeds 120°C during more than 20 s, the outdoor unit will stop and retry when the guard timer is OFF (3 min have passed).

During the retrial, the expansion valve will be opened 90 pulses more than in case of the previous start. When the unit restarts with a fully opened expansion valve, the remote controller displays “U0” after pressing the test button.

3

**Error generation**

The error is generated when the microcomputer detects gas shortage. However, the unit can still operate.

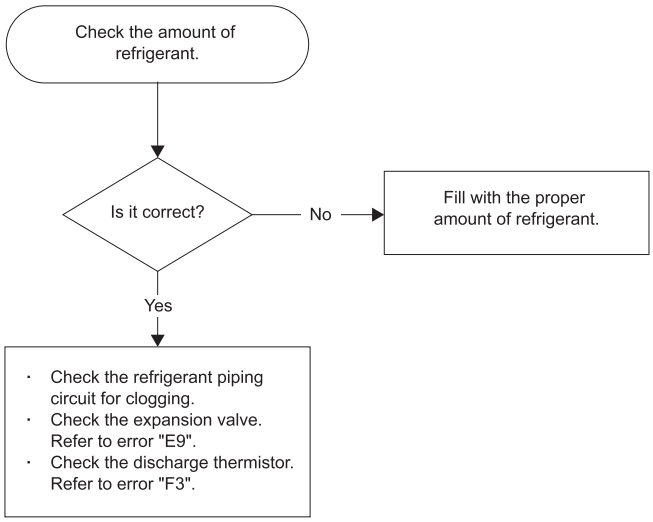
**Causes**

The possible causes are:

- ➤ Refrigerant shortage
- ➤ Clogging of the refrigerant piping circuit.

**Troubleshooting**

To troubleshoot, proceed as follows:




**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

## 4.3 Reverse Phase (U1)

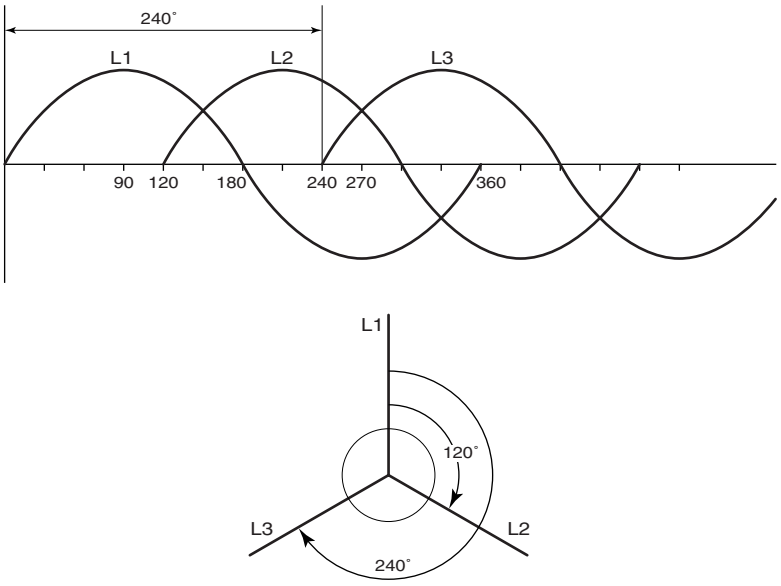
**Error code**

U1

This error code is only for 3-phase equipment.

**Error generation**

The error is generated when the difference between phase L1 and L3 is not 240°. The illustration below shows the 3-phase network.



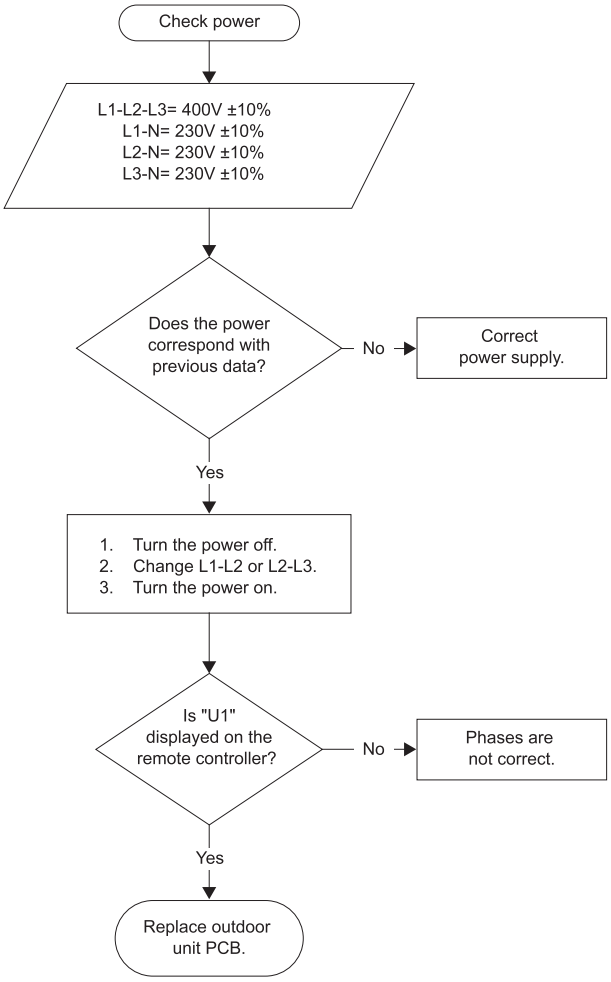

**Causes**

The possible causes are:

- ➤ Malfunctioning power supply wiring connection
- ➤ Broken or disconnected power supply wiring
- ➤ Malfunctioning outdoor unit PCB

**Troubleshooting**

To troubleshoot, proceed as follows:




**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

## 4.4 Transmission Error between Indoor and Outdoor Unit (U4 or UF)

**Error code**

U4 or UF

**Error generation**

The error is generated when the microprocessor detects that the transmission between the indoor and the outdoor unit is not normal over a certain amount of time.

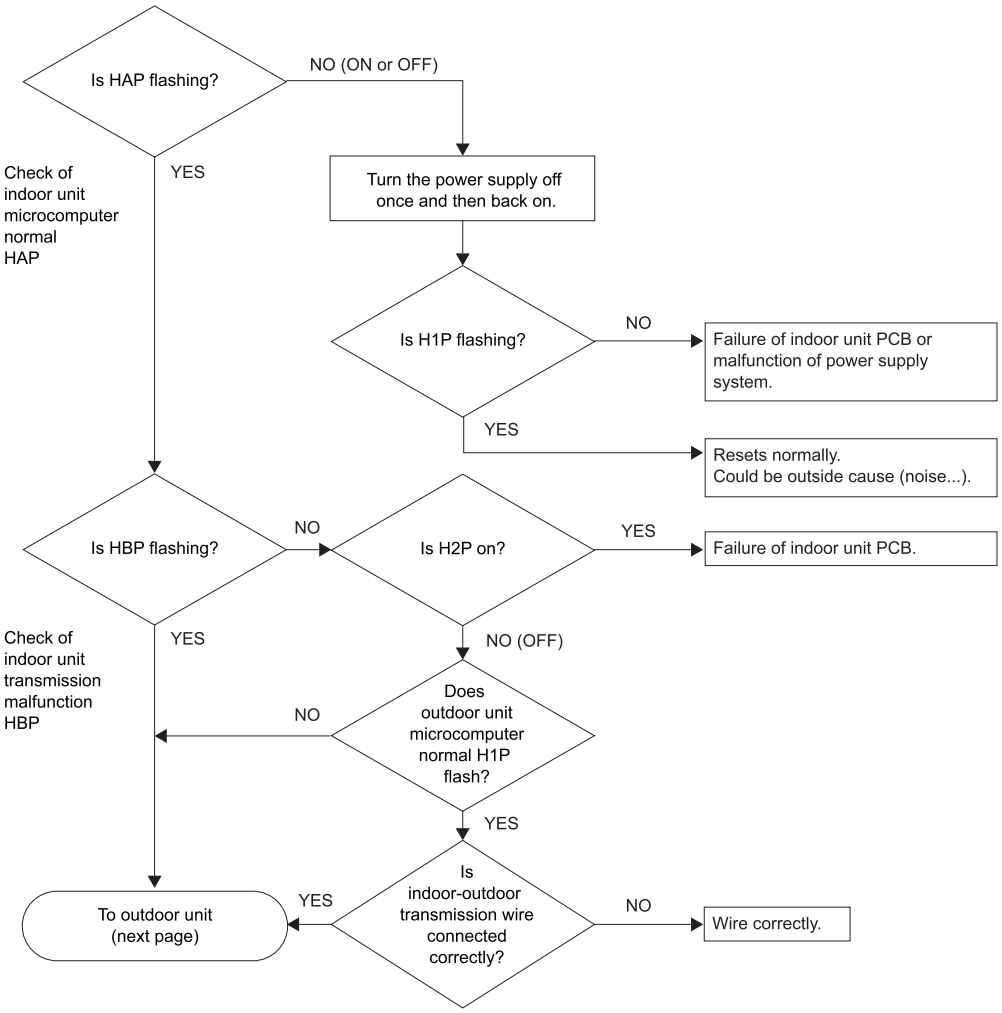
**Causes**

The possible causes are:

- ➤ Wiring indoor-outdoor transmission wire is incorrect
- ➤ Malfunctioning indoor unit PCB
- ➤ Malfunctioning outdoor unit PCB
- ➤ Outside cause (noise...).

**Troubleshooting 1**

Diagnosis of incorrect or broken/disconnected wiring. If the LEDs on the indoor unit PC board are off, it indicates that the transmission wiring between indoor and outdoor units may be incorrect or broken/disconnected.:

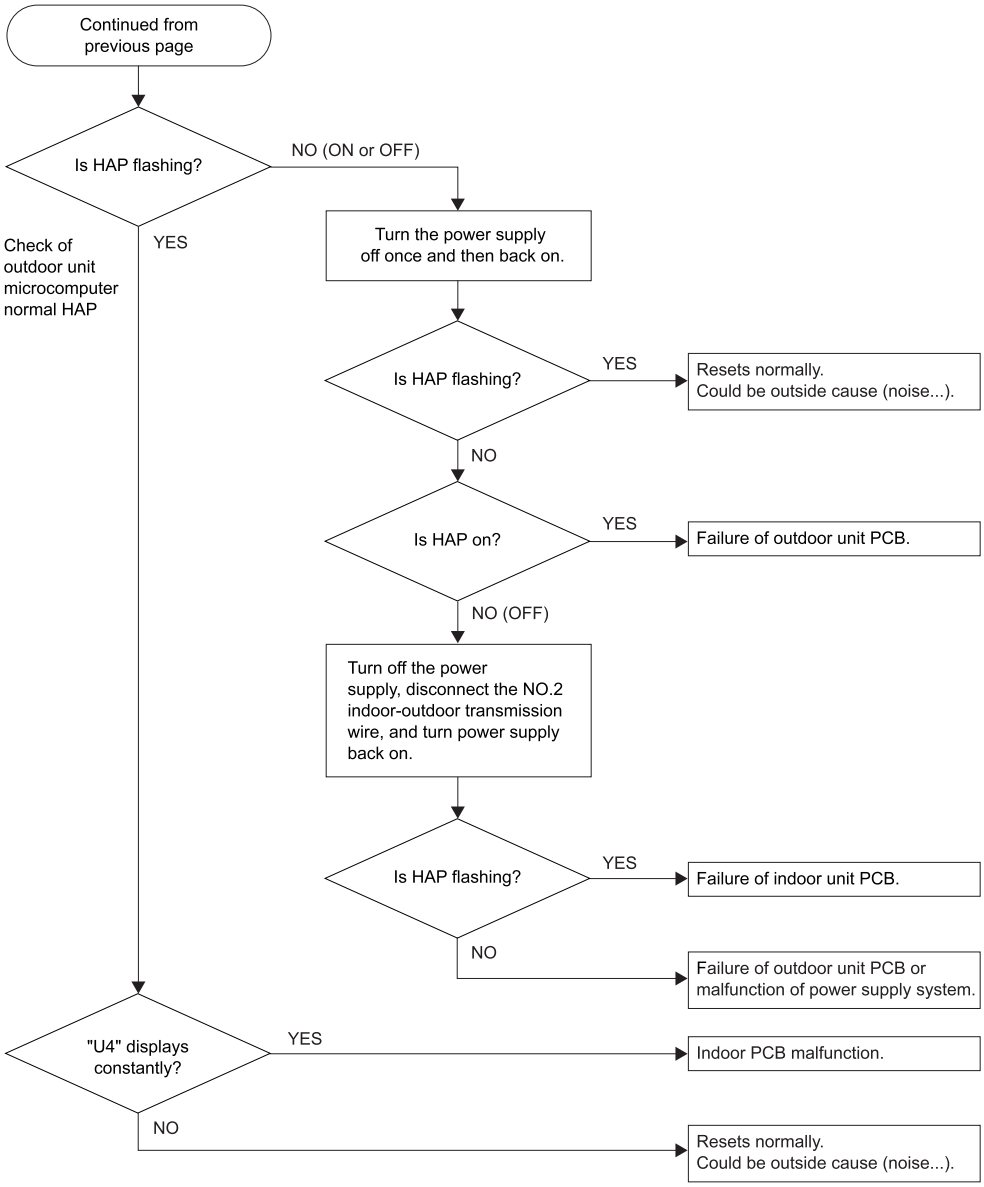



**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

**Troubleshooting 2**

To troubleshoot, proceed as follows:




**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

## 4.5 Transmission Error between Indoor Unit and Remote Controller (U5)

**Error code**

U5

**Error generation**

The error is generated when the microprocessor detects that the transmission between the indoor unit and the remote controller is not normal over a certain amount of time.

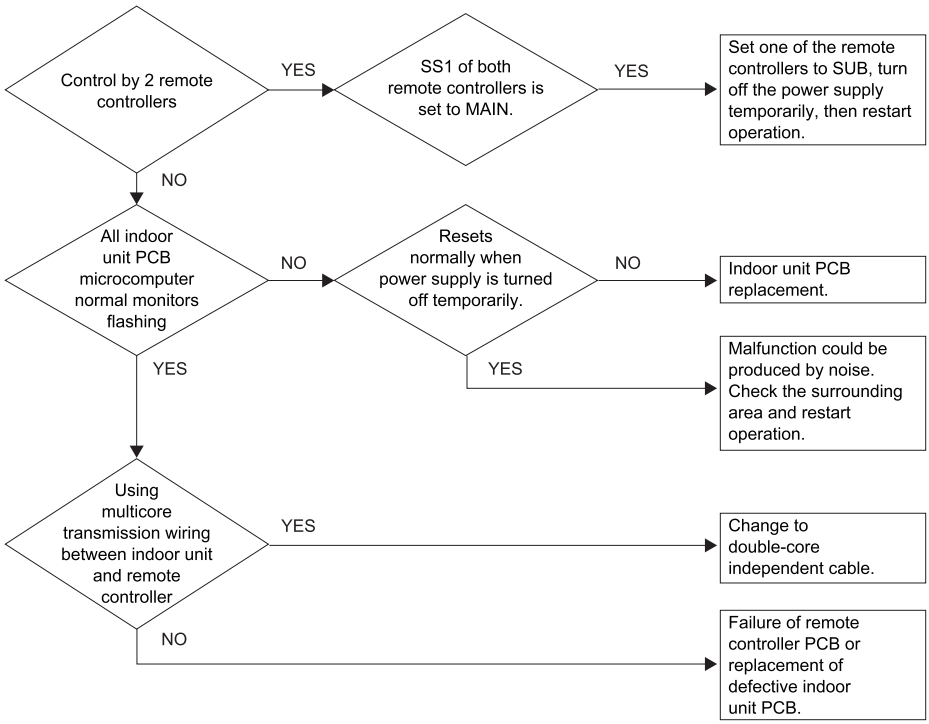
**Causes**

The possible causes are:

- ➤ Malfunctioning remote controller
- ➤ Malfunctioning indoor PCB
- ➤ Outside cause (noise...)
- ➤ Connection of two master remote controllers (when using two remote controllers).

**Troubleshooting**

To troubleshoot, proceed as follows:




**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

## 4.6 Transmission Error between MAIN Remote Controller and SUB Remote Controller (U8)

**Error code**

U8

**Error generation**

The error is generated when, in case of controlling with two remote controllers, the microprocessor detects that the transmission between the indoor unit and the remote controllers (MAIN and SUB) is not normal over a certain amount of time.

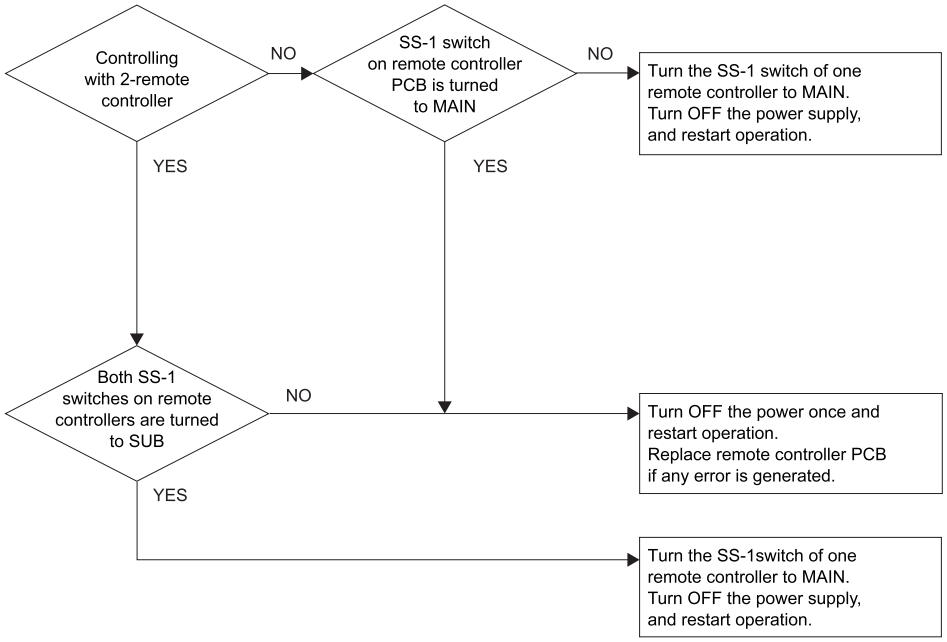
**Causes**

The possible causes are:

- ➤ Transmission error between MAIN remote controller and SUB remote controller
- ➤ Connection among SUB remote controllers
- ➤ Malfunctioning remote controller PCB.

**Troubleshooting**

To troubleshoot, proceed as follows:




**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

## 4.7 Malfunctioning Field Setting Switch (UA)

**Error code**

UA

**Error generation**

The error is generated when incorrect field settings have been set for pair/twin/triple/double twin.

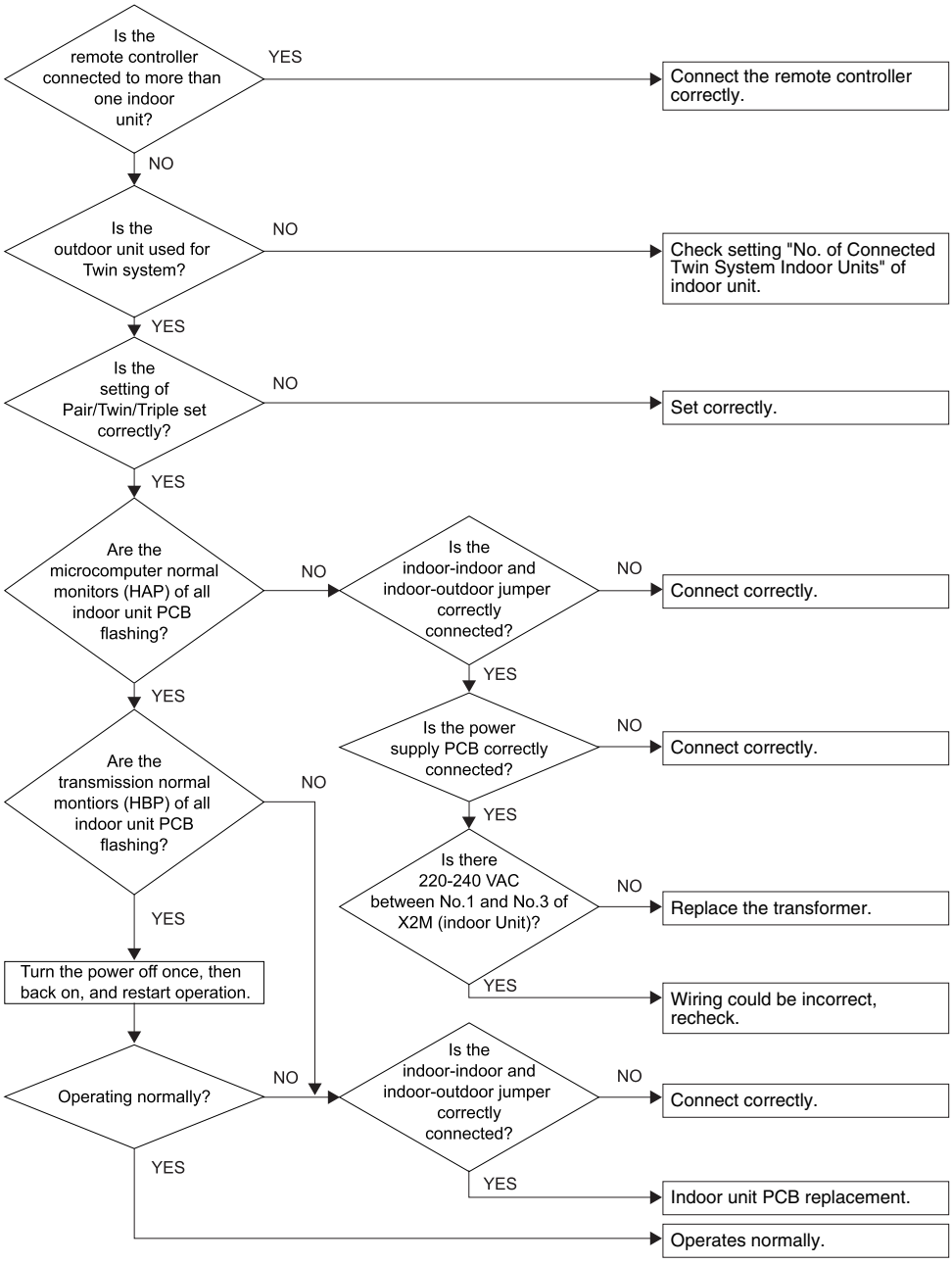
**Causes**

The possible causes are:

- ➤ Malfunctioning indoor or outdoor unit PCB
- ➤ Malfunctioning power supply PCB
- ➤ Indoor-outdoor, indoor-indoor unit transmission wiring
- ➤ Malfunctioning remote controller wiring.

**Troubleshooting**

To troubleshoot, proceed as follows:




**Caution**

Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

# 5 Additional Checks for Troubleshooting

## 5.1 What Is in This Chapter?

**Introduction**

This chapter explains how you must check the units to carry out troubleshooting correctly.

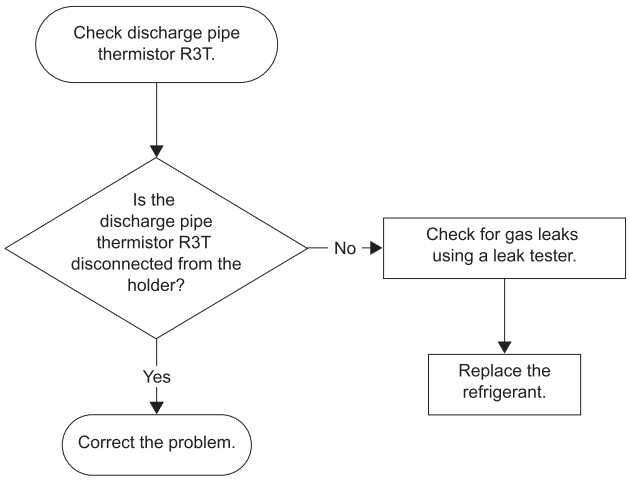
**Overview**

This chapter contains the following topics:

## 5.2 Checking the Refrigerant System

**Checking**

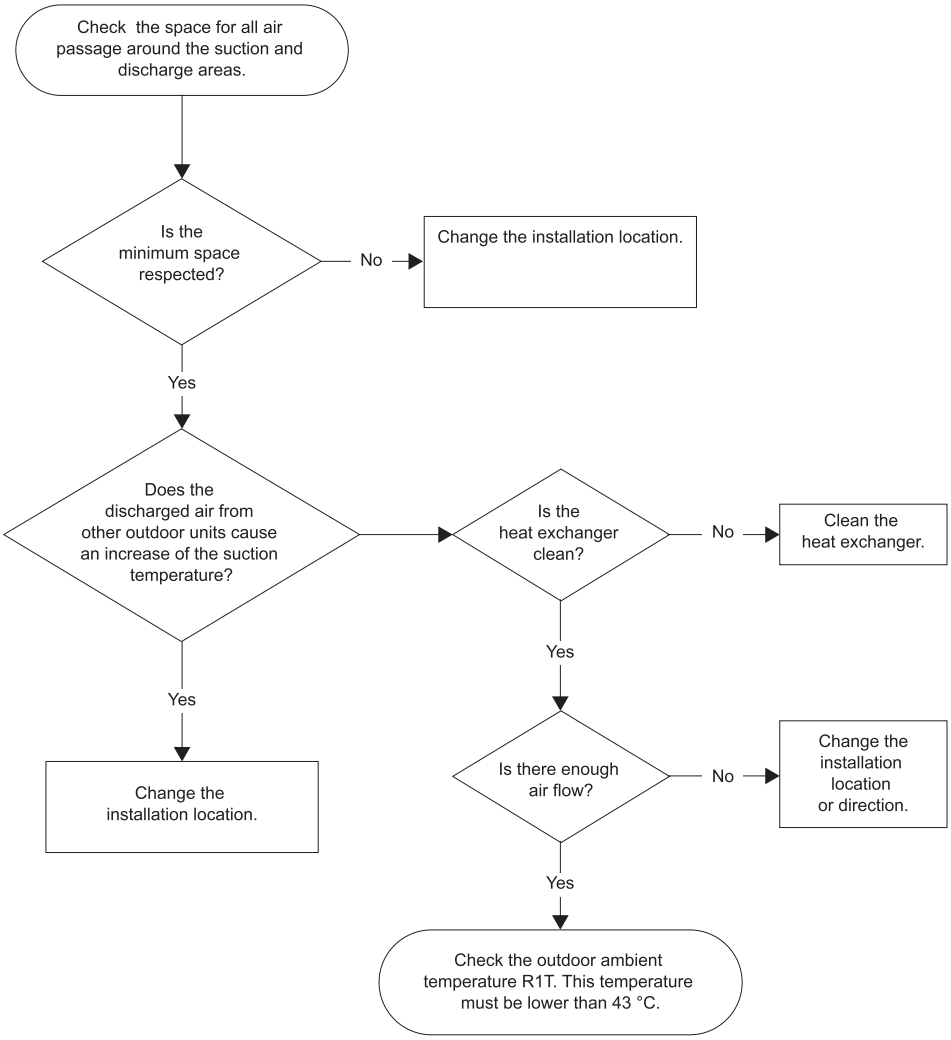
To check the refrigerant system, proceed as follows:



## 5.3 Checking the Installation Condition

**Checking**

To check the installation condition, proceed as follows:



## 5.4 Checking the Expansion Valve

**Checking**

To check the electronic expansion valve, proceed as follows:

| Step | Action |
|---|---|
| 1 | Check if the expansion valve connector is correctly inserted in the X24A of PCB 1. |
| 2 | Compare the expansion valve unit with the number of the connector to make sure it is correctly connected. |
| 3 | Switch the power OFF. |
| 4 | Switch the power ON to check whether the expansion valve is producing a clicking sound. |

| If... | Then... |
|---|---|
| The expansion valve has no clicking sound | Disconnect the valve connector without the clicking sound and proceed to step 5. |

**5** Check the coil current: Open circuit < normal < short circuit

The table below contains the reference resistance values for the 71 class.

| | Red | Brown | Blue | Orange | Yellow | White |
|---|---|---|---|---|---|---|
| **Red** | – | ∞ | ∞ | 45 Ω | ∞ | 45 Ω |
| **Brown** | ∞ | – | 45 Ω | ∞ | 45 Ω | ∞ |
| **Blue** | ∞ | 45 Ω | – | ∞ | 90 Ω | ∞ |
| **Orange** | 45 Ω | ∞ | ∞ | – | ∞ | 90 Ω |
| **Yellow** | ∞ | 45 Ω | 90 Ω | ∞ | – | ∞ |
| **White** | 45 Ω | ∞ | ∞ | 90 Ω | ∞ | – |

The table below contains the reference resistance values for the 100/125 class.

| | Orange | Red | Yellow | Black | Gray | White |
|---|---|---|---|---|---|---|
| **Orange** | – | ∞ | 90 Ω | ∞ | 45 Ω | ∞ |
| **Red** | ∞ | – | ∞ | 90 Ω | ∞ | 45 Ω |
| **Yellow** | 90 Ω | ∞ | – | ∞ | 45 Ω | ∞ |
| **Black** | ∞ | 90 Ω | ∞ | – | ∞ | 45 Ω |
| **Gray** | 45 Ω | ∞ | 45 Ω | ∞ | – | ∞ |
| **White** | ∞ | 45 Ω | ∞ | 45 Ω | ∞ | – |

| Step | Action |
|---|---|
| 6 | Check the clicking sound again. |

| If... | Then... |
|---|---|
| There is a clicking sound | The expansion valve works properly. |
| There is no clicking sound | Replace the expansion valve unit. |
| There is still no clicking sound | Replace outdoor PCB 1. |

## 5.5 Checking the Thermistors

**Thermistors**

If the cause of the problem is related to the thermistors, then the thermistors should be checked prior to changing the PCB.

For more information about these thermistors, see:

- ➤ 'Wiring Diagrams: Outdoor Units'
- ➤ "Functions of Thermistors" on page 4.

**Overview of thermistors**

The table below contains an overview of the thermistors:

| Thermistor | | Description |
|---|---|---|
| Indoor | R1T | Suction air thermistor |
| | R2T | Heat exchanger thermistor (coil thermistor) |
| Outdoor | R1T | Ambient air thermistor |
| | R2T | Heat exchanger thermistor (coil thermistor) |
| | R3T | Discharge pipe thermistor |

**Checking**

To check the thermistors, proceed as follows:

| Step | Action |
|---|---|
| **1** | Disconnect the thermistor from the PCB. |
| **2** | Read the temperature and the resistor value. |
| **3** | Check if the measured values correspond with the values in the table on the next pages. |

## 5.6 R1T and R2T

**Temperature – resistance**

The table below is the thermistor (R1T and R2T) temperature – resistance conversion table.

| Temp. (°C) | R1T (kΩ) | R2T (kΩ) | Temp. (°C) | R1T (kΩ) | R2T (kΩ) | Temp. (°C) | R1T (kΩ) | R2T (kΩ) |
|---|---|---|---|---|---|---|---|---|
| -20 | 197.81 | 192.08 | 20 | 25.01 | 24.45 | 60 | 4.96 | 4.87 |
| -19 | 186.53 | 181.16 | 21 | 23.91 | 23.37 | 61 | 4.79 | 4.70 |
| -18 | 175.97 | 170.94 | 22 | 22.85 | 22.35 | 62 | 4.62 | 4.54 |
| -17 | 166.07 | 161.36 | 23 | 21.85 | 21.37 | 63 | 4.46 | 4.38 |
| -16 | 156.80 | 152.38 | 24 | 20.90 | 20.45 | 64 | 4.30 | 4.23 |
| -15 | 148.10 | 143.96 | 25 | 20.00 | 19.56 | 65 | 4.16 | 4.08 |
| -14 | 139.94 | 136.05 | 26 | 19.14 | 18.73 | 66 | 4.01 | 3.94 |
| -13 | 132.28 | 128.63 | 27 | 18.32 | 17.93 | 67 | 3.88 | 3.81 |
| -12 | 125.09 | 121.66 | 28 | 17.54 | 17.17 | 68 | 3.75 | 3.68 |
| -11 | 118.34 | 115.12 | 29 | 16.80 | 16.45 | 69 | 3.62 | 3.56 |
| -10 | 111.99 | 108.96 | 30 | 16.10 | 15.76 | 70 | 3.50 | 3.44 |
| -9 | 106.03 | 103.18 | 31 | 15.43 | 15.10 | 71 | 3.38 | 3.32 |
| -8 | 100.41 | 97.73 | 32 | 14.79 | 14.48 | 72 | 3.27 | 3.21 |
| -7 | 95.14 | 92.61 | 33 | 14.18 | 13.88 | 73 | 3.16 | 3.11 |
| -6 | 90.17 | 87.79 | 34 | 13.59 | 13.31 | 74 | 3.06 | 3.01 |
| -5 | 85.49 | 83.25 | 35 | 13.04 | 12.77 | 75 | 2.96 | 2.91 |
| -4 | 81.08 | 78.97 | 36 | 12.51 | 12.25 | 76 | 2.86 | 2.82 |
| -3 | 76.93 | 74.94 | 37 | 12.01 | 11.76 | 77 | 2.77 | 2.72 |
| -2 | 73.01 | 71.14 | 38 | 11.52 | 11.29 | 78 | 2.68 | 2.64 |
| -1 | 69.32 | 67.56 | 39 | 11.06 | 10.84 | 79 | 2.60 | 2.55 |
| 0 | 65.84 | 64.17 | 40 | 10.63 | 10.41 | 80 | 2.51 | 2.47 |
| 1 | 62.54 | 60.96 | 41 | 10.21 | 10.00 | | | |
| 2 | 59.43 | 57.94 | 42 | 9.81 | 9.61 | | | |
| 3 | 56.49 | 55.08 | 43 | 9.42 | 9.24 | | | |
| 4 | 53.71 | 52.38 | 44 | 9.06 | 8.88 | | | |
| 5 | 51.09 | 49.83 | 45 | 8.71 | 8.54 | | | |
| 6 | 48.61 | 47.42 | 46 | 8.37 | 8.21 | | | |
| 7 | 46.26 | 45.14 | 47 | 8.05 | 7.90 | | | |
| 8 | 44.05 | 42.98 | 48 | 7.75 | 7.60 | | | |
| 9 | 41.95 | 40.94 | 49 | 7.46 | 7.31 | | | |
| 10 | 39.96 | 39.01 | 50 | 7.18 | 7.04 | — | | |
| 11 | 38.08 | 37.18 | 51 | 6.91 | 6.78 | | | |
| 12 | 36.30 | 35.45 | 52 | 6.65 | 6.53 | | | |
| 13 | 34.62 | 33.81 | 53 | 6.41 | 6.53 | | | |
| 14 | 33.02 | 32.25 | 54 | 6.65 | 6.53 | | | |
| 15 | 31.50 | 30.77 | 55 | 6.41 | 6.29 | | | |
| 16 | 30.06 | 29.37 | 56 | 6.18 | 6.06 | | | |
| 17 | 28.70 | 28.05 | 57 | 5.95 | 5.84 | | | |
| 18 | 27.41 | 26.78 | 58 | 5.74 | 5.43 | | | |
| 19 | 26.18 | 25.59 | 59 | 5.14 | 5.05 | | | |

## 5.7 R3T

**Temperature – resistance**

The table below is the thermistor (R3T) temperature – resistance conversion table.

| Temp. (°C) | Resist. (kΩ) | Temp. (°C) | Resist. (kΩ) | Temp. (°C) | Resist. (kΩ) |
|---|---|---|---|---|---|
| — | — | 60.0 | 52.8 | 130.0 | 5.4 |
| — | — | 62.0 | 48.9 | 132.0 | 5.4 |
| -6.0 | 1120.0 | 64.0 | 45.3 | 134.0 | 4.8 |
| -4.0 | 1002.5 | 66.0 | 42.0 | 136.0 | 4.6 |
| -2.0 | 898.6 | 68.0 | 39.0 | 138.0 | 4.3 |
| 0.0 | 806.5 | 70.0 | 36.3 | 140.0 | 4.1 |
| 2.0 | 724.8 | 72.0 | 33.7 | 142.0 | 3.9 |
| 4.0 | 652.2 | 74.0 | 31.4 | 144.0 | 3.7 |
| 6.0 | 587.6 | 76.0 | 29.2 | 146.0 | 3.5 |
| 8.0 | 530.1 | 78.0 | 27.2 | 148.0 | 3.3 |
| 10.0 | 478.8 | 80.0 | 25.4 | 150.0 | 3.2 |
| 12.0 | 432.9 | 82.0 | 23.7 | 152.0 | 3.0 |
| 14.0 | 392.0 | — | — | 154.0 | 2.9 |
| 16.0 | 355.3 | — | — | 156.0 | 2.7 |
| 18.0 | 322.4 | — | — | 158.0 | 2.6 |
| 20.0 | 292.9 | — | — | 160.0 | 2.5 |
| 22.0 | 266.3 | 92.0 | 16.9 | 162.0 | 2.3 |
| 24.0 | 242.5 | 94.0 | 15.8 | 164.0 | 2.5 |
| 26.0 | 221.0 | 96.0 | 14.8 | 166.0 | 2.1 |
| 28.0 | 201.6 | 98.0 | 13.9 | 168.0 | 2.0 |
| 30.0 | 184.1 | 100.0 | 13.1 | 170.0 | 1.9 |
| 32.0 | 168.3 | 102.0 | 12.3 | 172.0 | 1.9 |
| 34.0 | 154.0 | 104.0 | 11.5 | 174.0 | 1.8 |
| 36.0 | 141.0 | 106.0 | 10.8 | 176.0 | 1.7 |
| 38.0 | 129.3 | 108.0 | 10.2 | 178.0 | 1.6 |
| 40.0 | 118.7 | 110.0 | 9.6 | 180.0 | 1.5 |
| 42.0 | 109.0 | 112.0 | 9.0 | | |
| 44.0 | 100.2 | 114.0 | 8.5 | | |
| 46.0 | 92.2 | 116.0 | 8.0 | | |
| 48.0 | 84.9 | 118.0 | 7.6 | | |
| 50.0 | 78.3 | 120.0 | 7.1 | — | |
| 52.0 | 72.2 | 122.0 | 6.7 | | |
| 54.0 | 66.7 | 124.0 | 6.4 | | |
| 56.0 | 61.6 | 126.0 | 6.0 | | |
| 48.0 | 57.0 | 128.0 | 5.7 | | |

## 5.8 Evaluation of abnormal high pressure

Abnormally high pressure level is mostly caused by the condenser side. The following contents are provided by service engineer based on their field checks. Further, the number is listed in the order of degree of influence.

**In cooling operation**

| Check items (Possible causes) | Judgment |
|---|---|
| Does the outdoor unit fan run normally? | Visual inspection |
| Is the outdoor unit heat exchanger clogged? | Visual inspection |
| Is there clogging before or after the EV (capillary)? | Check if there is a temperature difference before and after EV (capillary).<br>Check if the main valve unit of EV operates (by noise, vibration). |
| Is the check valve clogged?<br>*Heat pump model only | Check if there is a temperature difference before and after check valve.<br>--> If YES, the check valve is caught. |
| Is the HPS normal? | Check continuity by using a tester. |
| Is the outdoor unit installed under such conditions that short circuit easily occurs? | Visual inspection |
| Is the piping length 5 meters or less? | Visual inspection |
| Does air enter the refrigerant system? | Conduct refrigerant collection and vacuum drying, and then add proper amount refrigerant. |
| Is the refrigerant overcharged? | Conduct refrigerant collection and vacuum drying, and then add proper amount refrigerant. |

**In heating operation**

| Check items (Possible causes) | Judgment |
|---|---|
| Does the indoor unit fan run normally? | Visual inspection |
| Is the indoor unit heat exchanger clogged? | Visual inspection |
| Is the indoor unit installed under such conditions that short circuit easily occurs? | Visual inspection |
| Is there clogging before or after the EV (capillary)? | Check if there is a temperature difference before and after EV (capillary).<br>Check if the main valve unit of EV operates (by noise, vibration). |
| Is the check valve clogged? | Check if there is a temperature difference before and after check valve.<br>--> If YES, the check valve is caught. |
| Is the HPS normal? | Check continuity using a tester. |
| Is the piping length 5 meters or less? | Visual inspection |
| Does air enter the refrigerant system? | Conduct refrigerant collection and vacuum drying, and then add proper amount refrigerant. |
| Is the refrigerant overcharged? | Conduct refrigerant collection and vacuum drying, and then add proper amount refrigerant. |

## 5.9 Evaluation of abnormal low pressure

Abnormally low pressure level is mostly caused by the evaporator side. The following contents are provided based on field checking of service engineer. Further, the number is listed in the order of degree of influence.

**In cooling operation**

| Check items (Possible causes) | Judgment |
|---|---|
| Does the outdoor unit fan run normally? | Visual inspection |
| Is the indoor unit filter clogged? | Visual inspection |
| Is there clogging before or after the EV (capillary)? | Check if there is a temperature difference before and after EV (capillary).<br>Check if the main valve unit of EV operates (by noise, vibration). |
| Is the check valve clogged?<br>*Heat pump model only | Check if there is a temperature difference before and after check valve.<br>-> If YES, the check valve is caught. |
| Is the LPS normal? | Check continuity using a tester. |
| Is the indoor unit installed under such conditions that short circuit easily occurs? | Visual inspection |
| Is the refrigerant gas short? | Conduct refrigerant collection and vacuum drying, and then add proper amount refrigerant. |

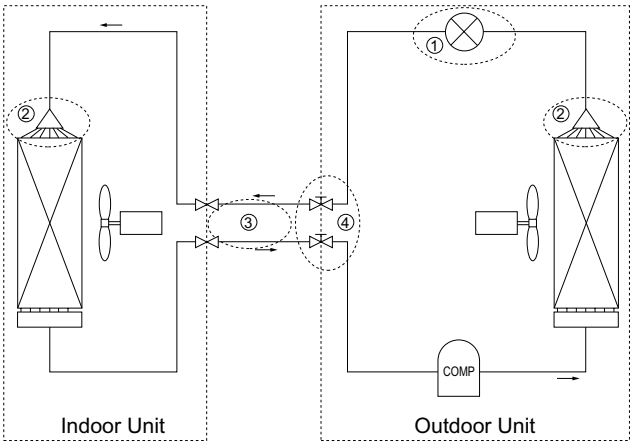
**In heating operation**

| Check items (Possible causes) | Judgment |
|---|---|
| Does the outdoor unit fan run normally? | Visual inspection |
| Is the outdoor unit heat exchanger clogged? | Visual inspection |
| Is the outdoor unit installed under such conditions that short circuit easily occurs? | Visual inspection |
| Is there clogging before or after the EV (capillary)? | Check if there is a temperature difference before and after EV (capillary).<br>Check if the main valve unit of EV operates (by noise, vibration). |
| Is the check valve clogged? | Check if there is a temperature difference before and after check valve.<br>--> If YES, the check valve is caught. |
| Is the LPS normal? | Check continuity using a tester. |
| Is the refrigerant gas short? | Conduct refrigerant collection and vacuum drying, and then add proper amount refrigerant. |

## 5.10 Check for Clogged Points

**Checks**

Temperature differences must occur before or after the clogged points!




| Check points | | Check factor | Causes | Remedies |
|---|---|---|---|---|
| 1 | Around expansion mechanism | Temperature difference | ➤ Dust<br>➤ Choked moisture<br>➤ Reduced effective pipe diameter due to adherent contamination, etc. | Replace the expansion valve. |
| 2 | Distributor | Temperature difference | ➤ Dust<br>➤ Choked moisture<br>➤ Reduced effective pipe diameter due to adherent contamination, etc. | Replace the heat exchanger or distributor. |
| 3 | Field piping | Temperature difference | ➤ Collapsed pipe | Replace the pipe. |
| 4 | Stop valve | Temperature difference | ➤ The stop valve is not fully open. | Open the stop valve fully. |

3

# Part 4
# Commissioning and Test Run

**What is in this part?** This part contains the following chapters:

# 1 Pre-Test Run Checks

## 1.1 What Is in This Chapter?

**Introduction**

This chapter contains the following information:

- Checks before test run
- Test run checks
- Setting the address for the receiver of the wireless remote controller
- Setting the address for the wireless remote controller.

**Overview**

This chapter contains the following topics:

## 1.2 Test Run Checks

**Checks before test run**

Before carrying out a test run, proceed as follows:

| Step | Action |
|---|---|
| 1 | Make sure the voltage at the primary side of the safety breaker is:<br>➤ 230 V ± 10% for 1-phase units<br>➤ 400V ± 10% for 3-phase units. |
| 2 | Fully open the liquid and the gas stop valve. |

**Test run checks**

To carry out a test run, check the following:

➤ Check that the temperature setting of the remote controller is at the lowest level or test mode.

➤ Switch ON the indoor units one by one to check whether they operate correctly. Afterwards, switch ON all units to check whether they all operate simultaneously.

➤ Go through the following checklist:

| Checkpoints | Cautions or warnings |
|---|---|
| Are all units securely installed? | ➤ Dangerous for turning over during storm.<br>➤ Possible damage to pipe connections. |
| Is the earth wire installed according to the applicable local standard? | Dangerous if electric leakage occurs. |
| Are all air inlets and outlets of the indoor and outdoor units unobstructed? | ➤ Poor cooling.<br>➤ Poor heating. |
| Does the drain flow out smoothly? | Water leakage. |
| Is piping adequately heat-insulated? | Water leakage. |
| Have the connections been checked for gas leakage? | ➤ Poor cooling.<br>➤ Poor heating.<br>➤ Stop. |
| Is the supply voltage conform to the specifications on the name plate? | Incorrect operation. |
| Are the cable sizes as specified? | Damage of cables. |
| Are the remote controller signals received by the unit? | No operation. |

## 1.3 Setting the Wireless Remote Controller

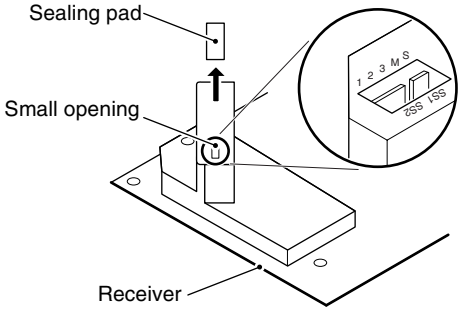
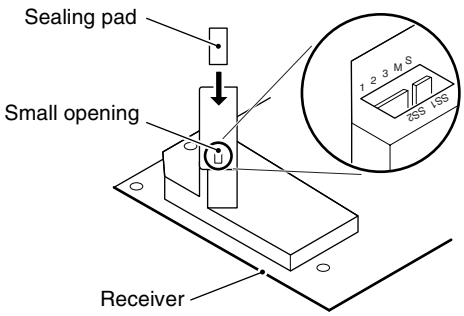
**Introduction**

To set the wireless remote controller, you have to set the address for:

- ➤ The receiver of the wireless remote controller
- ➤ The wireless remote controller.

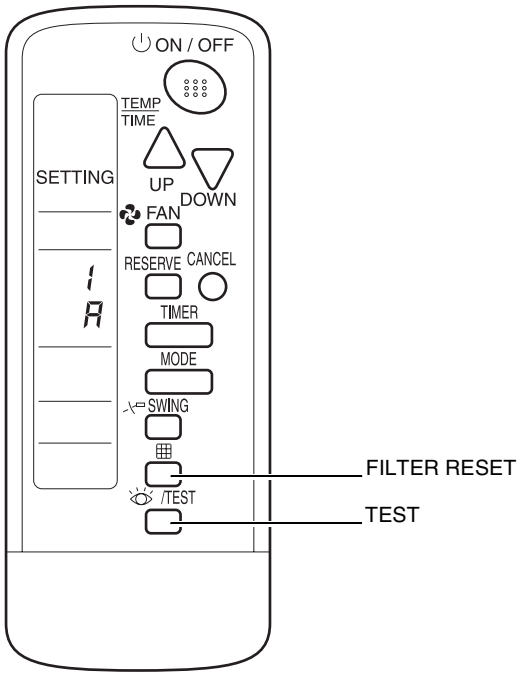
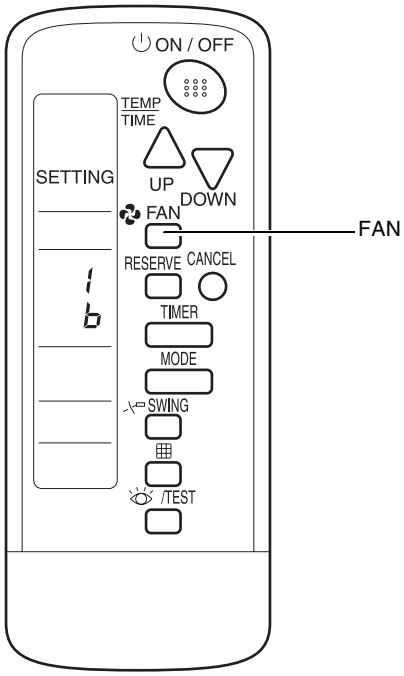
**Setting the address for the receiver**

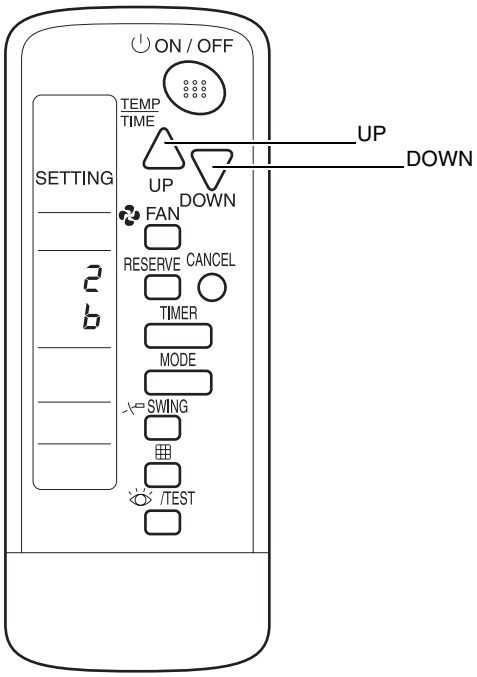
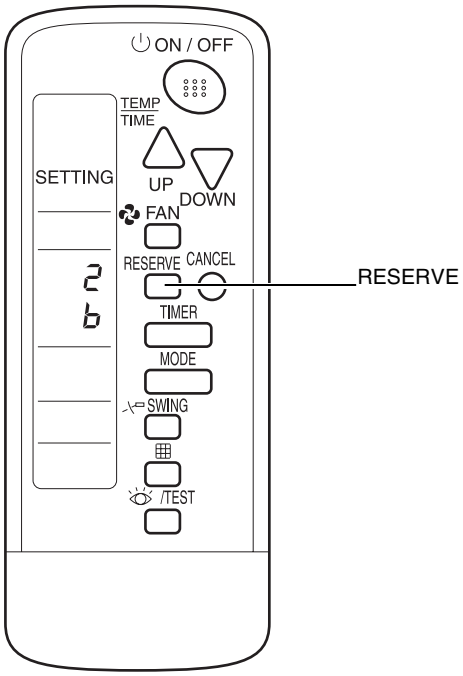
The address for the receiver of the wireless remote controller is factory set to 1. To change this setting, proceed as follows:

| Step | Action |
|---|---|
| 1 | Turn OFF the power. |
| 2 | Remove the sealing pad on the top of the receiver.<br>  <br> |
| 3 | Set the wireless address switch (SS2) according to the table below. You can find the wireless address switch attached on the PCB of the receiver and it is visible through the small opening on the back of the receiver.<br>**Unit No.** \| No. 1 \| No. 2 \| No. 3<br>**SS2** \| 1 2 3 \| 1 2 3 \| 1 2 3 |
| 4 | If you use a wired and a wireless remote controller for one indoor unit, proceed as follows:<br>1. Set the wired remote controller to MAIN: On the remote controller.<br>2. Set the wireless remote controller to SUB: On the receiver with the MAIN/SUB switch (SS1).<br>**MAIN/SUB** \| MAIN \| SUB<br>**SS1** \| S M \| S M |
| 5 | Seal off the opening of the address switch and the MAIN/SUB switch with the attached sealing pad.<br>  <br> |
| 6 | Make sure to also change the address on the remote controller. |

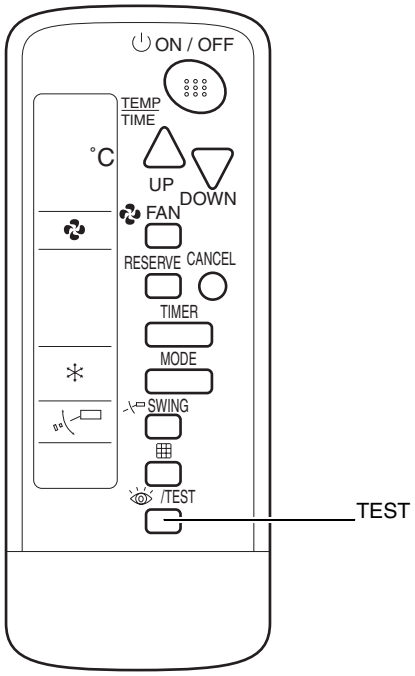
**Setting the address for the wireless remote controller**

The address for the wireless remote controller is factory set to 1. To change this setting, proceed as follows:

| Step | Action |
|---|---|
| 1 | Hold down the FILTER RESET button and the TEST button for at least 4 s, to go to field set mode. The display indicates the field set mode.   |
| 2 | Press the FAN button to select a multiple setting (A/b), see ‘Multiple settings A/b’ further in this section. Each time you press the button, the display switches between “A” and “b”.   |

| Step | Action |
|---|---|
| 3 | Press the UP and DOWN buttons to set the address. Set the same address as the receiver (1, 2 or 3). The receiver does not work with addresses 4, 5 and 6.   |
| 4 | Press the RESERVE button to confirm the setting.   |

4

| Step | Action |
|---|---|
| 5 | Press the TEST button to quit the field set mode and return to the normal display.  |



4

**Multiple settings A/b**

When an outside control (central remote controller...) controls an indoor unit, sometimes the indoor unit does not respond to ON/OFF and temperature settings commands from this controller.

| Remote controller | | Indoor unit | |
|---|---|---|---|
| **Setting** | **Remote controller display** | **Control of other air conditioners and units** | **No other control** |
| A: Standard | All items are displayed. | Commands other than ON/OFF and temperature setting accepted. (1 long beep or 3 short beeps emitted) | |
| b: Multi System | Only one item is displayed. This item is only shown for a few seconds. | All commands accepted (2 short beeps) | |

# 2 Field settings

## 2.1 What Is in This Chapter?

**Introduction**

This chapter contains the following information:

- ➤ How to change the field settings
- ➤ The field settings
- ➤ The factory settings.

**Overview**

This chapter contains the following topics:

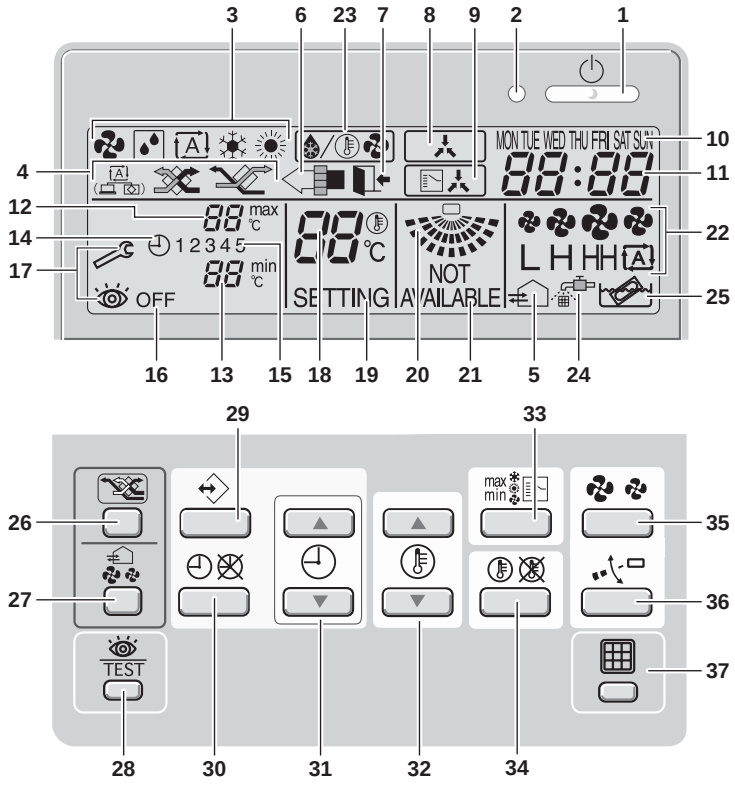
## 2.2 How to Change the Field Settings with the Wired Remote Controller

**Installation conditions**

The field settings have to be changed with the remote controller according to the installation conditions.

**Wired remote controller**

The illustration below shows the wired remote controller.




**Components**

The table below contains the components of the wired remote controller.

| No. | Component | No. | Component |
|---|---|---|---|
| 1 | ON/OFF button | 20 | Air flow direction icon |
| 2 | Operation lamp | 21 | Not available |
| 3 | Operation mode icon | 22 | Fan speed icon |
| 4 | Ventilation mode icon | 23 | Defrost/hotstart mode icon |
| 5 | Ventilation icon | 24 | Air filter cleaning time icon |
| 6 | Air cleaning icon | 25 | Element cleaning time icon |
| 7 | Leave home icon | 26 | Ventilation mode button |
| 8 | External control icon | 27 | Ventilation amount button |
| 9 | Change-over under centralised control icon | 28 | Inspection/test operation button |
| 10 | Day of the week indicator | 29 | Programming button |
| 11 | Clock display | 30 | Schedule timer button |
| 12 | Maximum set temperature | 31 | Time adjust button |
| 13 | Minimum set temperature | 32 | Temperature adjust buttons |
| 14 | Schedule timer icon | 33 | Operation change/ button |
| 15 | Action icons | 34 | Setpoint/limit button |
| 16 | Off icon | 35 | Fan speed button |
| 17 | Inspection required | 36 | Air flow direction adjust button |
| 18 | Set temperature display | 37 | Air filter cleaning time icon reset |
| 19 | Setting | | |

**Setting**

To set the field settings, you have to change:

- ➤ “Mode No.”
- ➤ “First code No.”
- ➤ “Second code No.”.

To change the field settings, proceed as follows:

| Step | Action |
|---|---|
| **1** | Hold down the INSPECTION/TEST button for at least 4 s during normal mode to enter the “Field setting mode”. |
| **2** | Press the TEMPERATURE CONTROL button until the desired “Mode No.” appears. |
| **3** | ➤ If the indoor unit is under group control, all settings for all the indoor units are set at the same time. Use the codes 10 to 15 to apply this group control and proceed to the next step.<br>➤ If you want to set the indoor units of one group individually or if you want to read out the last settings, use the codes 20 to 25 which are displayed in brackets. Press the TIMER SELECTION button to select the “Indoor unit No.” for which you want to adjust the field settings. |
| **4** | Press the upper part of the PROGRAMMING TIME button to select the “First code No.”. |
| **5** | Press the lower part of the PROGRAMMING TIME button to select the “Second code No”. |
| **6** | Press the CONFIRMATION button to confirm the changed setting. |
| **7** | Press the INSPECTION/TEST button to return to “Normal mode”. |

## 2.3 How to Change the Field Settings with the Wireless Remote Controller

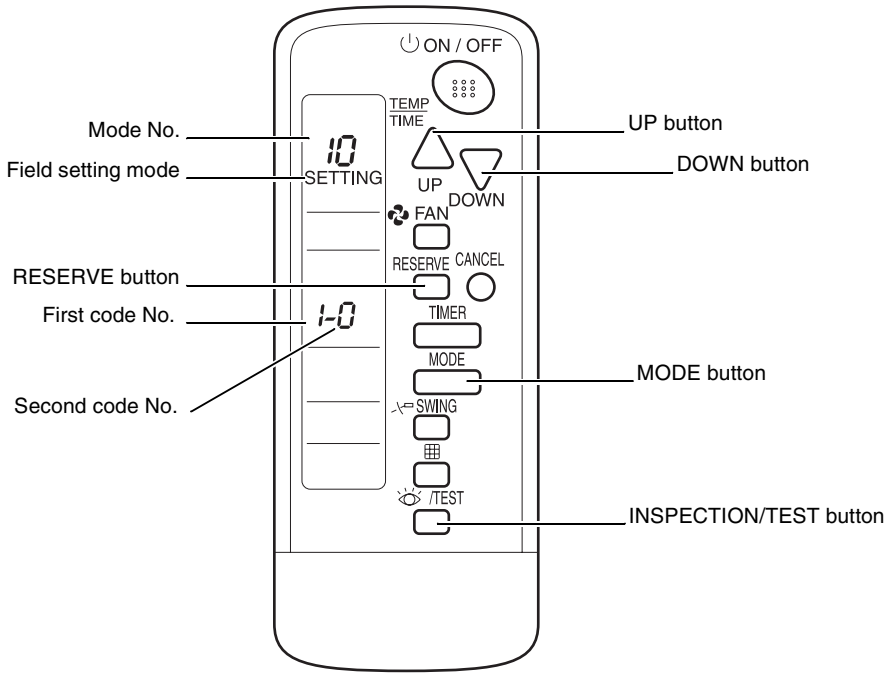
**Optional accessories**

If optional accessories are mounted on the indoor unit, the indoor unit setting may have to be changed.

Refer to OH98-2 or the installation manual (optional handbook) for each optional accessory.

**Wireless remote controller**

The illustration below shows the wireless remote controller.




**Setting**

To set the field settings, you have to change:

- ➤ “Mode No.”
- ➤ “First code No.”
- ➤ “Second code No.”.

To change the field settings, proceed as follows:

| Step | Action |
|---|---|
| 1 | Hold down the INSPECTION/TEST button for at least 4 s during normal mode to enter the “Field setting mode”. |
| 2 | Press the MODE button to select the desired “Mode No.”. |
| 3 | Press the UP button to select the “First code No.”. |
| 4 | Press the DOWN button to select the “Second code No.” |
| 5 | Press the RESERVE button to set the present settings. |
| 6 | Press the INSPECTION/TEST button to return to the “Normal mode”. |

## 2.4 Overview of the Field Settings of the Indoor Units

**Field settings** The table below contains the possible field settings of all indoor units.

| Mode No. | First code No. | Description of the setting | Second code No. | | | |
|---|---|---|---|---|---|---|
| | | | 01 | 02 | 03 | 04 |
| 10 or 20 | 0 | Filter counter | Light contamination | heavy contamination | — | — |
| | 1 | Filter type | Long | Super long | External | Oil mist |
| | 2 | Remote thermistor of the remote controller | TH1 = rem. controller | TH1 = air return | — | — |
| | 3 | Filter display | Filter indic. | No filter indic. | — | — |
| 11 or 21 | 0 | Number indoor to 1 outdoor | Pair | Twin | Triple | Double twin |
| | 1 | Unified or indiv. set twin | Group setting | Indiv. setting | — | — |
| | 2 | Fan OFF at thermostat OFF | LL-speed | OFF | — | — |
| 12 or 22 | 0 | KRP1B51/52/53 X1/X2 output | Thermostat ON | Option | Operation | Malfunction |
| | 1 | EKRORO | Forced OFF | ON/OFF operation | — | — |
| | 3 | Fan speed heating thermostat OFF | LL-speed | Set speed | — | — |
| | 5 | Automatic restart | Disabled | Enabled | — | — |
| 13 or 23 | 0 | Ceiling height setting | Normal | High | Extra high | — |
| | | | ≤ 2.7 m | >2.7≤3.0 m | >3.0≤3.5 m | — |
| | 1 | Selection of air flow direction (setting for when a blocking pad kit has been installed). | 4-way flow | 3-way flow | 2-way flow | — |
| | 3 | Horizontal discharge grill | Enabled | Disabled | — | — |
| | 4 | Air flow direction adjust range setting | Draft prevention | Standard | Ceil soil prevention | — |
| | 5 | Field fan speed changeover air outlet (domestic only) | Standard | Option 1 | Option 2 | — |
| | 6 | External static pressure | Normal | High | Low | — |
| 14 or 24 | 0 | Additional timer to guard timer | 0 s | 5 s | 10 s | 15 s |
| 1b (only when using BRC1D527) | 0 | Permission level setting | Level 2 | Level 3 | — | — |
| | 1 | Leave home function | Not permitted | Permitted | — | — |
| | 2 | Thermostat sensor in remote controller (for limit operation and leave home function only) | Use | Not use | — | — |

## 2.5 Overview of the Factory Settings of the Indoor Units

**Factory settings** The table below contains the factory settings of all indoor units

| Mode No. | First code No. | Second code No. | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | FCQ | FFQ | FBQ | FAQ | FDQ | FUQ | FHQ |
| 10 or 20 | 0 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
| | 1 | 01 | 01 | 01 | — | 02 | 01 | — |
| | 2 | 02 | 02 | 02 | — | 02 | 02 | 02 |
| | 3 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
| 11 or 21 | 0 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
| | 1 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
| | 2 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
| 12 or 22 | 0 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
| | 3 | 01 | 01 | 01 | — | — | — | — |
| | 5 | 02 | 02 | 02 | 02 | 02 | 02 | 02 |
| 13 or 23 | 0 | 01 | — | — | 01 | — | 01 | 01 |
| | 1 | 01 | 01 | — | — | — | — | — |
| | 3 | — | — | — | — | — | — | — |
| | 4 | 02 | 02 | — | — | — | — | — |
| | 5 | 01 | 01 | — | 01 | — | 01 | 01 |
| | 6 | — | — | 01 | — | — | — | — |
| 14 or 24 | 0 | 01 | 01 | 01 | — | 01 | 01 | 01 |

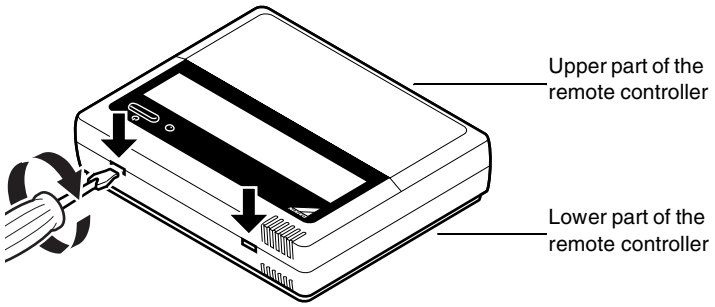
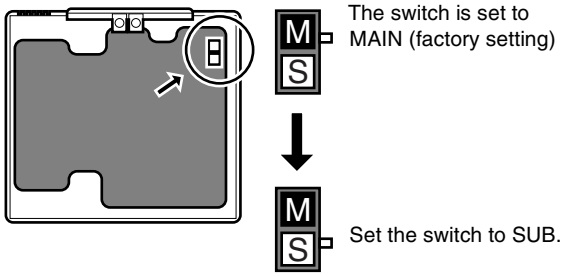
## 2.6 MAIN/SUB Setting when Using Two Remote Controllers

**Situation**

The MAIN/SUB setting is necessary when one indoor unit is controlled by two remote controllers. When you use two remote controllers (control panel and separate remote controller), set one to MAIN and the other to SUB. You can do this by setting the switch on the remote controller's PCB.

**Setting**

The remote controllers are factory set to MAIN, so you only have to change one remote controller from MAIN to SUB. To change a remote controller from MAIN to SUB, proceed as follows:

| Step | Action |
|---|---|
| 1 | Insert a flathead screwdriver into the recess between the upper and lower part of the remote controller, as shown in the illustration below. Gently pry off the upper part of the controller, working from the two possible positions.<br>  <br> |
| 2 | Turn the MAIN/SUB changeover switch on the PCB to "S".<br>  <br> |

4

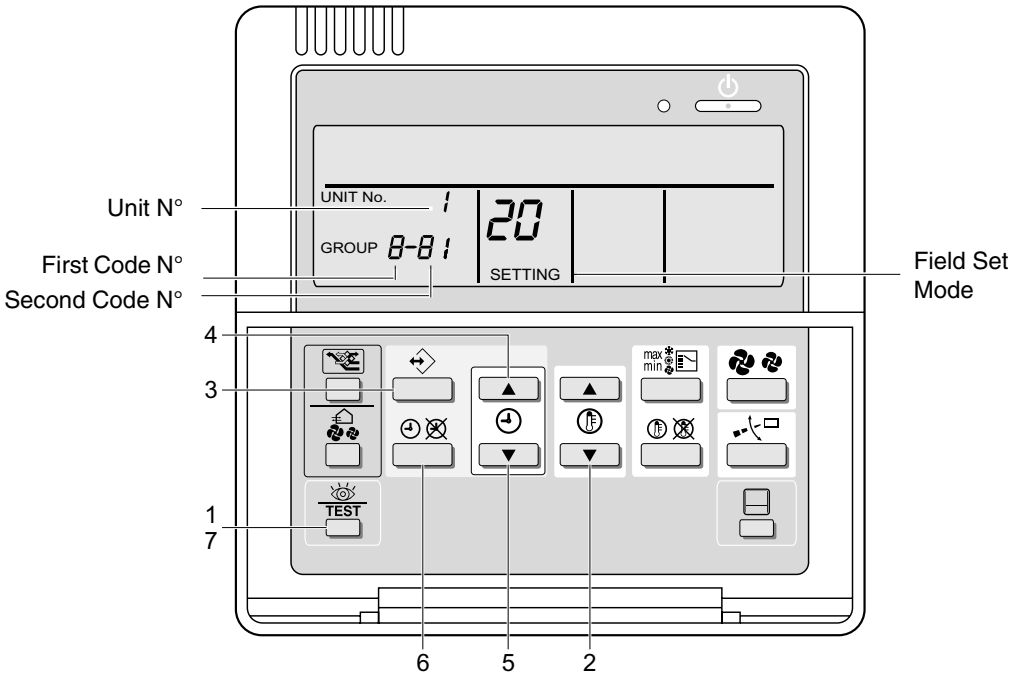
## 2.7 Setting the Centralized Group No.

**When?**

If you want to carry out centralized control with a central remote controller and a unified ON/OFF controller, you have to set the group No. for each group with the remote controller.

**Wired remote controller**

The illustration below shows the wired remote controller.




**Setting**

To set the “Centralized group No.”, proceed as follows:

| Step | Action |
|---|---|
| 1 | Switch ON the power supply of the central remote controller, the unified ON/OFF controller and the indoor unit(s). |
| 2 | Hold down the INSPECTION/TEST button for at least 4 s during normal mode to enter the “Field setting mode”. |
| 3 | Press the TEMPERATURE CONTROL button until “Mode No.” “00” appears. |
| 4 | Press the INSPECTION/TEST button to inspect the group No. display. |
| 5 | Set the “Group No.” for each group by pressing the PROGRAMMING TIME button.<br>The “Group No.” rises in the order of 1—00, 1—01, ..., 1—15, 2—00, ..., 2—15, 3—00, etc.<br>The unified ON/OFF controller however displays only the range of group numbers selected by the switch for setting each address. |
| 6 | Press the CONFIRMATION button to enter the selected group No. |
| 7 | Press the INSPECTION/TEST button to return to normal mode. |

**Individually address setting**

If the address must be set individually for each unit, set the “Mode No.” to “30”. For example, for power consumption counting.

**Note** It is not necessary to designate an indoor unit address when using group control. The address is automatically set when the power is activated.

## 2.8 Field settings when using a spare part PCB of Sky-Air B-series outdoor unit

**When**

In case the outdoor PCB needs to be replaced by a spare part PCB, it is required to execute below-mentioned field settings to ensure correct operation of the unit.

**Required action**

In case of repair using this part, replace the part according to the following instruction:

Attention on service!

**1** Please be sure to work after turning off all related circuit breakers.

**2** Before starting the work, please touch the metal part of the product to discharge static electricity.

| | |
|---|---|
| The parts for replacement | **1** The PCB ass'y |
| Accessories | **1** Capacity setting adaptor |
| | **2** Connector for protection (Only RR/RQ71-100B7W1B) |
| | **3** Connector for short-circuit (Only RR/RQ71-100B7W1B) |

Please replace the printed circuit board according to the following flow chart of "The flow to setup the printed circuit board ass'y".

The flow to setup the printed circuit board ass'y

**<Please check the capacity of the unit.>**

↓ Please attach the capacity setting adaptor (fig. 3) to X26A. (Refer to fig. 2 [Nr. 1])

**<Is the model RQ/RR71~125B7W1B?>** → No → **<RQ/RR71-100B7V3B>**

↓ Yes

**<Is the capacity of the unit 71 or 100?>** → No → **<RQ/RR125B7W1B>**

↓ Yes

**In the case of 71 or 100**

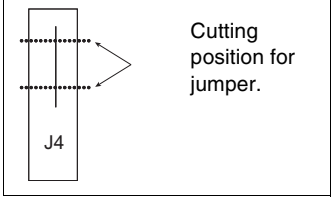
Please attach 2 connectors of accessories to printed circuit board ass'y
- Please attach the connector for terminal protection to X15A. (Refer to fig. 2 [Nr. 2])
- Please attach a short circuit connector to X12A. (Refer to fig. 2 [Nr. 3])

**<Is it a C/O or H/P?>** → H/P

↓ C/O

Please cut jumper J4, as shown in fig. 1 on this page. (Refer to fig. 2 [Nr. 4])

**Figure 1**




**<Replacement of the PCB ass'y>**

**<Replacement of the PCB ass'y>**

(CAUTION)

**How to exchange PCB ass'y from a resin case:**

**1** Resin cover is removed.

**2** All connectors are removed.

**3** Three hooks on the left side of a resin case are moved and PCB ass'y is removed. Beware not to damage the CT wire (yellow wire).

**4** PCB ass'y is exchanged.

**5** Please reconnect all connectors as before according to the electric wiring diagram.

**6** Resin cover is attached.

**<Test run>**

Please confirm that a test run is performed and that the system can operate normally after finishing the replacement.

**Figure 2: The outline drawing of the PCB assembly**

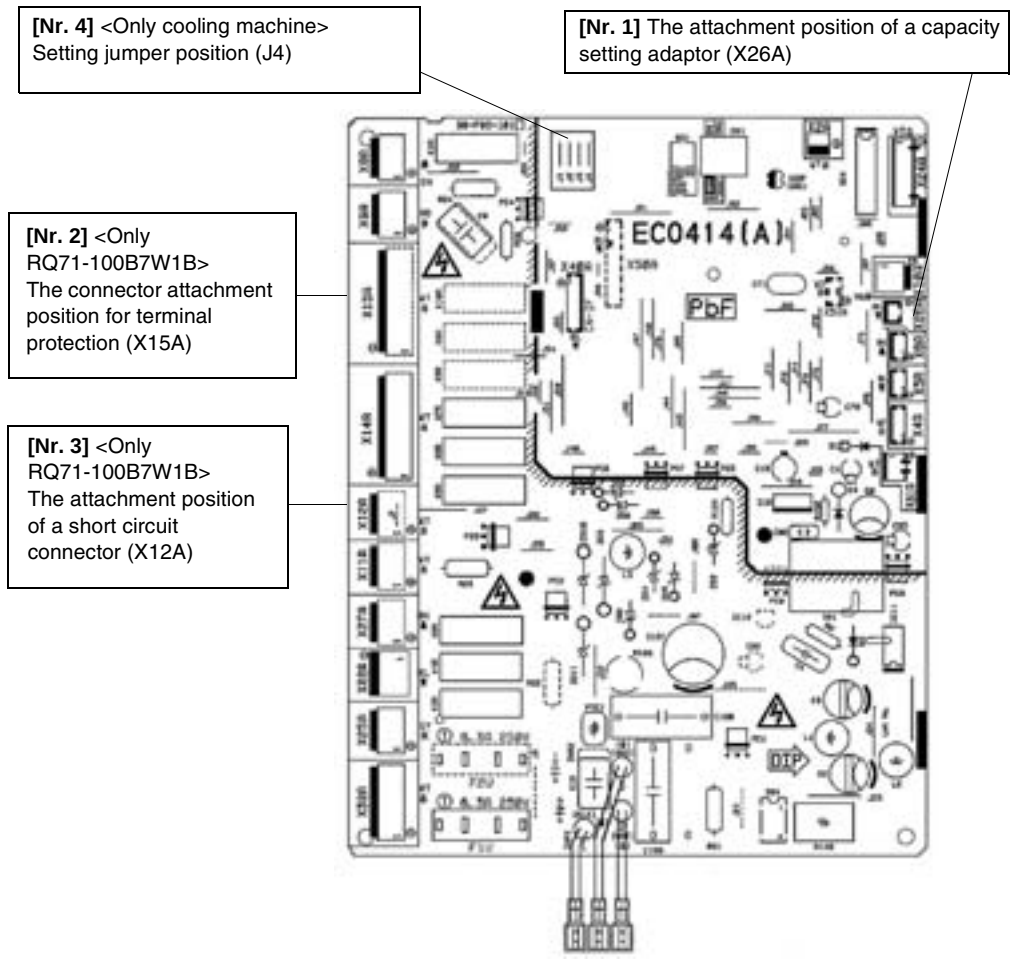
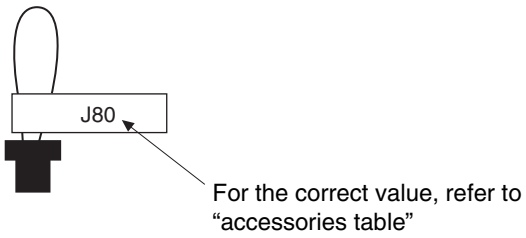



**Figure 3: Capacity establish adaptor outline figure**



## 2.9 The Field Setting Levels

**Introduction**

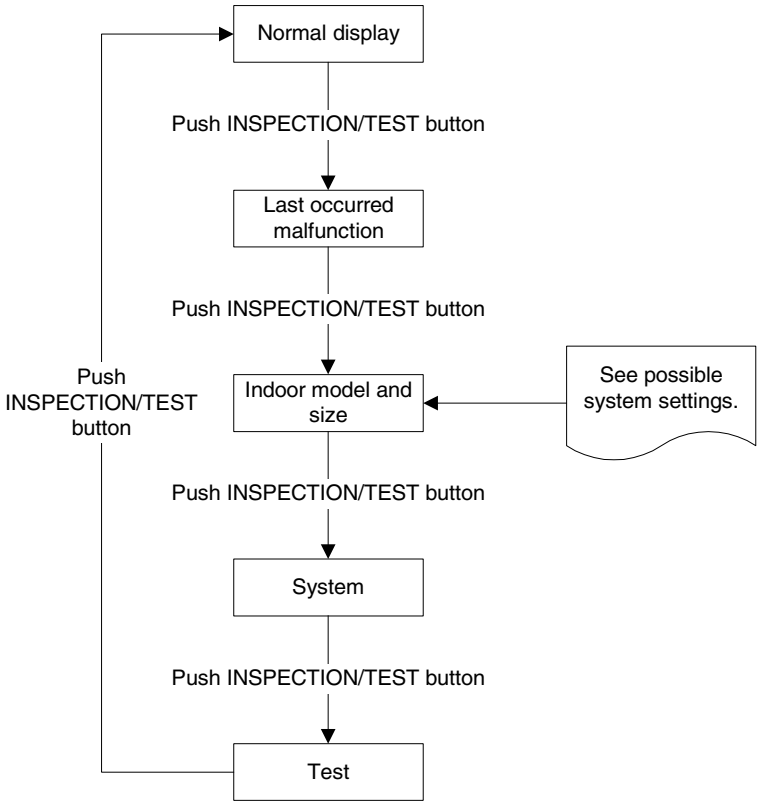
The three field setting levels are:

- ➤ Inspection level
- ➤ Monitoring level
- ➤ Maintenance mode settings.

**The inspection level**

The inspection level is the highest level of the three field setting levels. You can change the views in the inspection level by pressing the INSPECTION/TEST button.

The flow chart below explains the different windows of the inspection level.



**Possible system settings**

The table below contains the possible system settings, which are displayed on the remote controller if the TEST button is pushed twice shortly.

| Size | | Software | Type | |
|---|---|---|---|---|
| **Settings** | **Display** | | **Settings** | **Display** |
| 35 | 35 | 5 | FCQ | FJ |
| 45 | 45 | | FHQ | HJ |
| 60 | 63 | | FAQ | AJ |
| 71 | 71 | | FFQ | GJ |
| 100 | 100 | | FBQ | JJ |
| 125 | 125 | | FUQ | 3J |
| 200 | 200 | | FDQ | UJ |
| 250 | 250 | | — | |

4

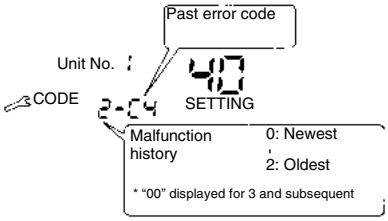
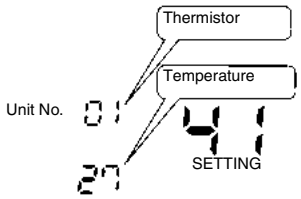
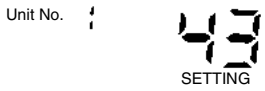
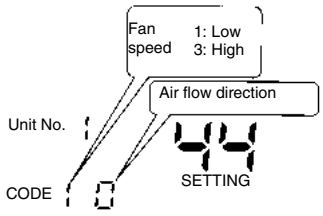
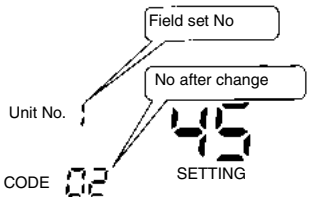
**Changing the mode settings**

To enter the monitoring level and to change the maintenance mode settings, proceed as follows:

| Step | Action |
|---|---|
| **1** | Hold down the INSPECTION/TEST button for at least 4 s to enter the field setting mode. |
| **2** | Hold down the INSPECTION/TEST button for at least 4 s to enter the maintenance mode. |
| **3** | Press the TEMPERATURE CONTROL buttons as many times as needed to select the mode No. you want. |
| **4** | Press the TIMER SELECTION button as many times as needed to select the unit No. you want. |
| **5** | Carry out the settings for modes 44 and 45. See “Maintenance Mode Settings” further in this section. |
| **6** | Press the CONFIRMATION button to confirm the settings of modes 44 and 45. |
| **7** | Press the INSPECTION/TEST button to return to the normal operating mode. |

**Maintenance Mode Settings**

The table below describes the maintenance mode settings.

| Mode No. | Function | Content and operation method | Example of the remote controller display |
|---|---|---|---|
| 40 | History error codes | Display malfunction history<br>The history No. can be changed with the programming time button. |  |
| 41 | Thermistor data display | Select the display thermistor with the programming time button.<br>Thermistor:<br>0. Remote control thermistor<br>1. Suction thermistor<br>2. Heat exchanger thermistor. |  |
| 43 | Forced fan ON | Turns the fan ON for each unit individually. |  |
| 44 | Individual setting | Sets fan speed and air flow direction for each unit individually when using group control.<br>Settings are made using the "air flow direction adjust" and "fan speed adjust" buttons. Confirmation by the confirmation button is required. |  |
| 45 | Unit No. change | Changes unit No.<br>Set the unit No. after changing with the programming time buttons. Confirmation by the confirmation button is required. |  |

4

## 2.10 Overview of the Field Settings: RR/RQ71~125B

**Jumpers**

The table below contains the jumper field settings.

| Jumper | Label on PCB | Function | Applicable units | See page |
|---|---|---|---|---|
| J1 | Thermo CTR | Change thermostat OFF control indoor unit | ➤ RR71~125B<br>➤ RQ71~125B | 4–25 |
| J3 | Thermo CTR2 | Change thermostat ON control indoor unit | | 4–25 |

**DIP switches**

The table below contains the DIP switch field settings.

| DIP switch | Function | Details | Applicable units | See page |
|---|---|---|---|---|
| DS1-1 | Emergency ON/OFF | Switch emergency operation outdoor unit ON | RR/RQ71~125B | 2–7 |
| DS1-2 | Cool / Heat | Select emergency cooling / heating operation on outdoor unit | | 2–7 |
| DS1-3 | NOT USED | | | |
| DS1-4 | NOT USED | | | |

**Remote controller settings**

The table below contains the remote controller settings.

| Mode N° | First code N° | Description | Second Code N° | | | Refer to |
|---|---|---|---|---|---|---|
| | | | 01 | 02 | 03 | |
| 16(or26) | 3 | Defrost start setting | Factory setting | Defrost slow starting | Defrost quick starting | 2–38 |

**BS**

The table below contains the BS field setting.

| BS | Label on PCB | Function | Applicable units | Details |
|---|---|---|---|---|
| BS1 | Pump down / forced defrost | Cooling/fan only: Pump down (see further in this section)<br>Heating: Forced defrosting (RQ only) | ➤ RR71~125B<br>➤ RQ71~125B | — |

**Pump down**

Pump down is preferably carried out with the indoor unit set to “fan only” in order to avoid compressor restart with closed stop valves after finishing the previous pump down operation (close stop valves, turn OFF the power supply).

If accidentally, the power was switched back ON, the unit will automatically restart with closed stop valves, which may result in a possible compressor breakdown.

## 2.11 Jumpers

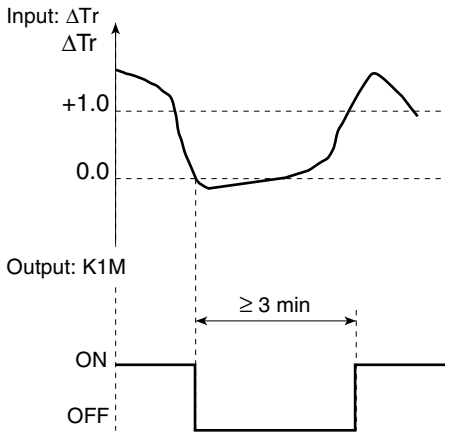
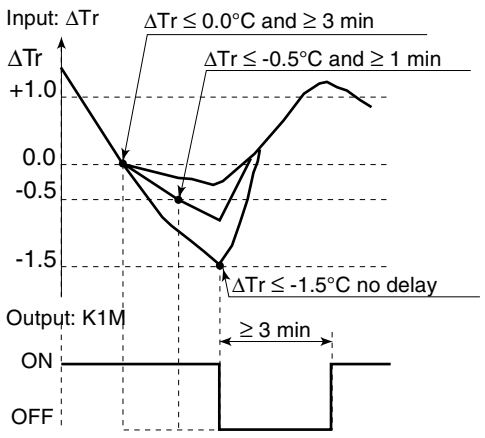
**Input and output**

The table below describes the input and the output of the jumpers.

| Item | Description | | | |
|---|---|---|---|---|
| Input | ΔTr | Cooling | ΔTr = Tr - Ts | ➤ Tr = indoor unit suction air temp.<br>➤ Ts = temp. set by the remote controller |
| | | Heating | ΔTr = Ts - Tr | |
| Output | Magnetic switch compressor K1M | | | |

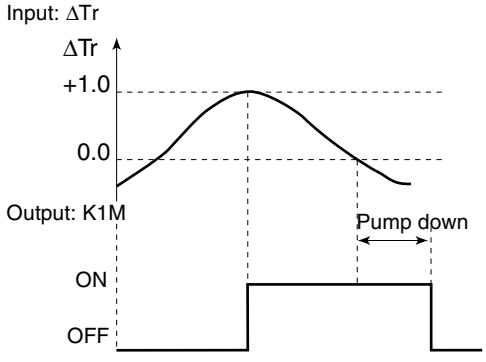
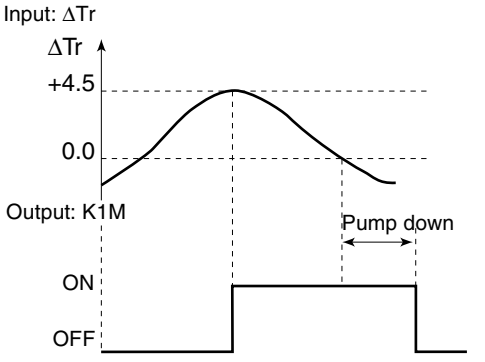
**J1**

The function of jumper J1 is to reduce the possibility of thermostat OFF (reduce ON/OFF cycle compr.).

| Factory setting (closed state) | Field setting (open state) |
|---|---|
| Thermostat goes into OFF-state when<br>ΔTr ≤ 0.0°C | Thermostat goes into OFF-state when<br>➤ -0.5°C < ΔTr ≤ 0.0°C for 3 min, or<br>➤ -1.5°C < ΔTr ≤ -0.5°C for 1 min, or<br>➤ ΔTr ≤ -1.5°C |
|  |  |

**J3**

The function of jumper J3 is to increase the differential for thermo ON.

| Factory setting (closed state) | Field setting (open state) |
|---|---|
| Thermostat goes into ON-state when<br>ΔTr ≥ 1.0°C | Thermostat goes into ON-state when<br>ΔTr ≥ 4.5°C |
|  |  |

# 3 Test Run and Operation Data

**Introduction**

This chapter contains the following information:

- General operation data
- Operation ranges.

**Overview**

This chapter contains the following topics:

## 3.1 General Operation Data

**During cooling mode and dry keep**

The operating conditions must be as follows:

| Items | Operating modes | If the operation is out this range... |
|---|---|---|
| Outdoor temp. | ➤ c/o: -15 to +46°CDB<br>➤ h/p: -5 to +46°CDB | ➤ A safety device may stop the operation.<br>➤ Condensation may occur on the indoor unit and start dripping. |
| Indoor temp. | +12 to +28°CWB | |
| Indoor humidity | 80% | |

The operation values are guidelines in the operation range:

- ➤ LP: 6 bar ~ 9.8 bar (low pressure)
- ➤ HP: 26.2 bar ~ 33.9 bar (high pressure)
- ➤ Td: 60 ~ 100°C (discharge pipe temperature compressor)
- ➤ Ts: -2 ~ 15°C (suction pipe temperature compressor)
- ➤ ΔTi: 8 ~ 16°C (indoor temperature difference |air return – air outlet|).

**During heating mode**

The operating conditions must be as follows:

| Items | Operating modes | If the operation is out this range... |
|---|---|---|
| Outdoor temp. | -10 to +15°CWB | A safety device may stop the operation. |
| Indoor temp. | +10 to +27°CDB | |

The operation values are guidelines in the operation range:

- ➤ LP: 5.3 bar ~ 9.5 bar (low pressure)
- ➤ HP: 25.3 bar ~ 32.7 bar (high pressure)
- ➤ Td: 60 ~ 100°C (discharge pipe temperature compressor)
- ➤ Ts: -15 ~ 10°C (suction pipe temperature compressor)
- ➤ ΔTi: 12 ~ 32°C (indoor temperature difference |air return – air outlet|).

**Correlation of Air- Conditioner's Operation Status and Pressure / Running Current**

What happens in comparison to normal values is summarized in the table below.
(Measured from 15 ~ 20 minutes or more after operation starts.)

**When Cooling**

| Air-Conditioner Status | Low Pressure | High Pressure | Running Current |
|---|---|---|---|
| Air Filter Fouling | Lower | Lower | Lower |
| Short Circuit of Indoor Unit Inlet/ Outlet Air | Lower | Lower | Lower |
| Outdoor Unit Fin Fouling | Higher | Higher | Higher |
| Short Circuit of Outdoor Unit Inlet/Outlet Air | Higher | Higher | Higher |
| Air Mixed in Refrigerant | Higher | Higher | Higher |
| Water Mixed in Refrigerant | *1 Lower | Lower | Lower |
| Dirt Mixed in Refrigerant | *2 Lower | Lower | Lower |
| Lack of Refrigerant (Gas) | Lower | Lower | Lower |
| Unsatisfactory Compression | *3 Higher | Lower | Lower |

**When Heating**

| Air-Conditioner Status | Low Pressure | High Pressure | Running Current |
|---|---|---|---|
| Air Filter Fouling | Higher | Higher | Higher |
| Short Circuit of Indoor Unit Inlet/ Outlet Air | Higher | Higher | Higher |
| Outdoor Unit Fin Fouling | Lower | Lower | Lower |
| Short Circuit of Outdoor Unit Inlet/Outlet Air | Lower | Lower | Lower |
| Air Mixed in Refrigerant | Higher | Higher | Higher |
| Water Mixed in Refrigerant | *1 Lower | Lower | Lower |
| Dirt Mixed in Refrigerant | *2 Lower | Lower | Lower |
| Lack of Refrigerant (Gas) | Lower | Lower | Lower |
| Unsatisfactory Compression | *3 Higher | Lower | Lower |

**Note**

*1. Water in the refrigerant freezes inside the capillary tube or expansion valve, and is basically the same phenomenon as pump down.

*2. Dirt in the refrigerant clogs filters inside the piping, and is basically the same phenomenon as pump down.

*3. Pressure differential between high and low pressure becomes slight.

## 3.2 RR71~125B

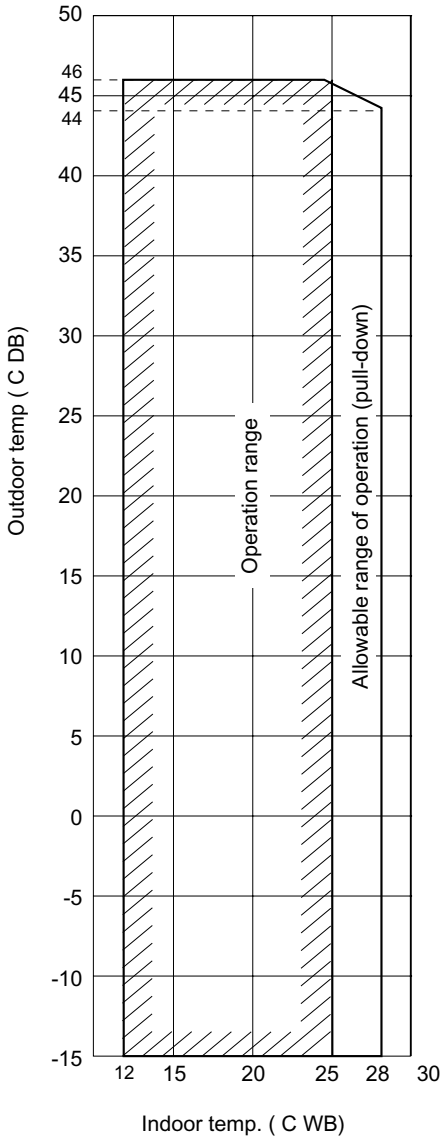
**Conditions**

The illustration in this section is based on the following conditions:

- Equivalent piping length: 7.5 m
- Level difference: 0 m
- Air flow rate: High.

**Operation range**

The illustration below shows the operation range.




**Notes**

- Depending on operation and installation conditions, the indoor unit can change over to freeze-up operation (indoor de-icing).
- To reduce the freeze-up operation (indoor de-icing) frequency it is recommended to install the outdoor unit in a location not exposed to wind.

## 3.3 RQ71~125B

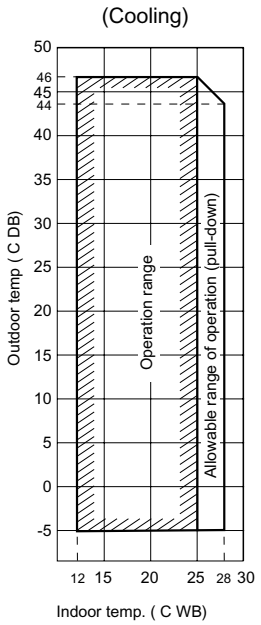
**Conditions**

The illustrations in this section are based on the following conditions:

- ➤ Equivalent piping length: 7.5 m
- ➤ Level difference: 0 m
- ➤ Air flow rate: High.

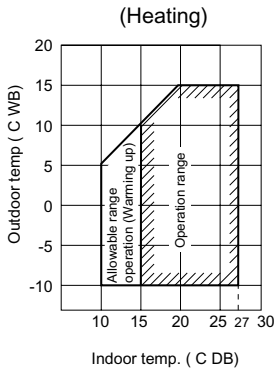
**Operation range: Cooling**

The illustration below shows the operation range.




**Operation range: Heating**

The illustration below shows the operation range.




**Notes**

- ➤ Depending on operation and installation conditions, the indoor unit can change over to freeze-up operation (indoor de-icing).
- ➤ To reduce the freeze-up operation (indoor de-icing) frequency it is recommended to install the outdoor unit in a location not exposed to wind.

# Part 5
# Disassembly and Maintenance

**What is in this part?** This part contains the following chapters:



5

5

# 1 Disassembly and Maintenance: Outdoor Units

## 1.1 What Is in This Chapter?

**Introduction**

This chapter contains the following information on the outdoor units:

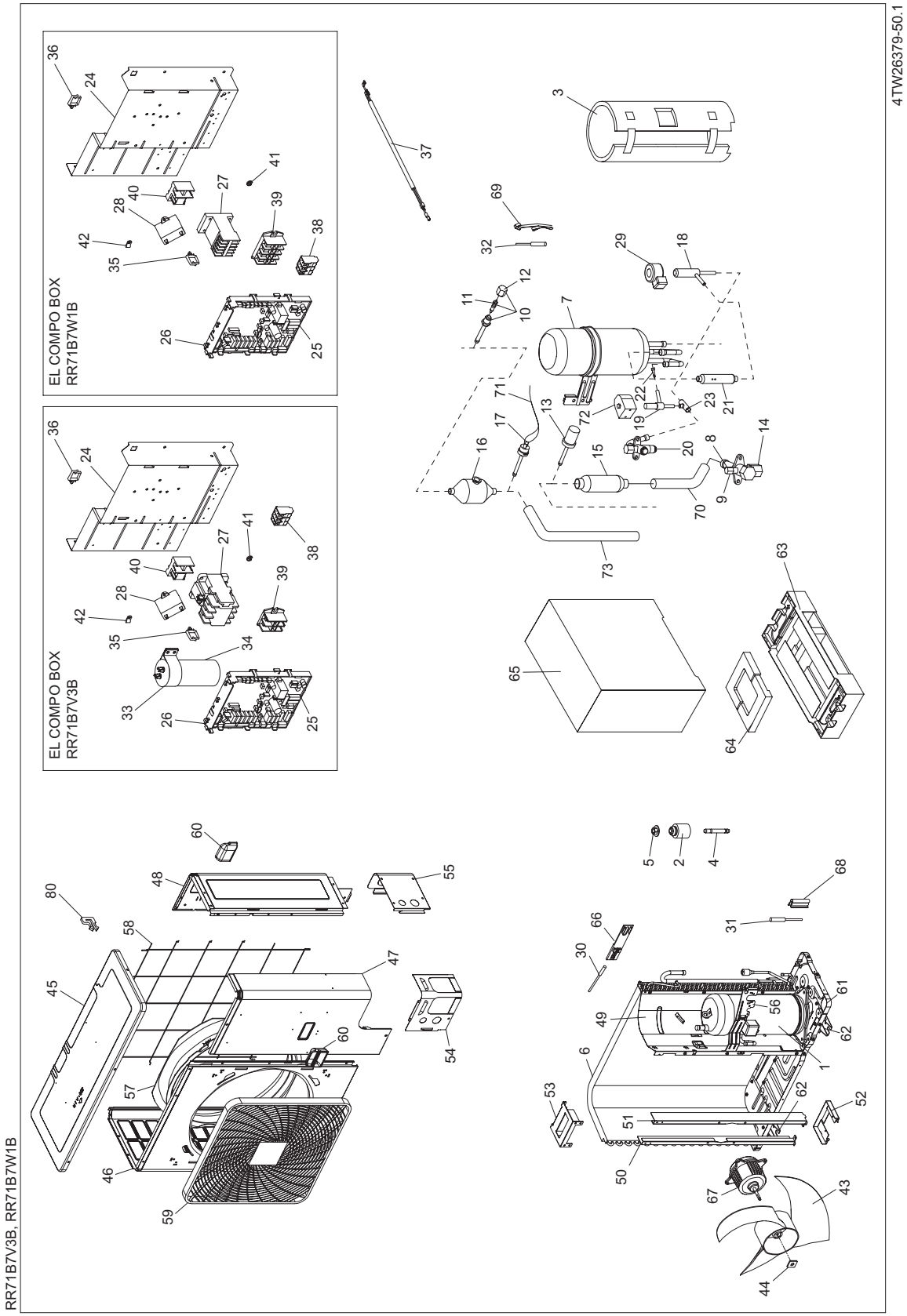
- Exploded views
- Components.

**Overview**

This chapter contains the following topics:

## 1.2 RR71V7V3B, RR71V7W1B

**Exploded view** The illustration below shows the exploded view.



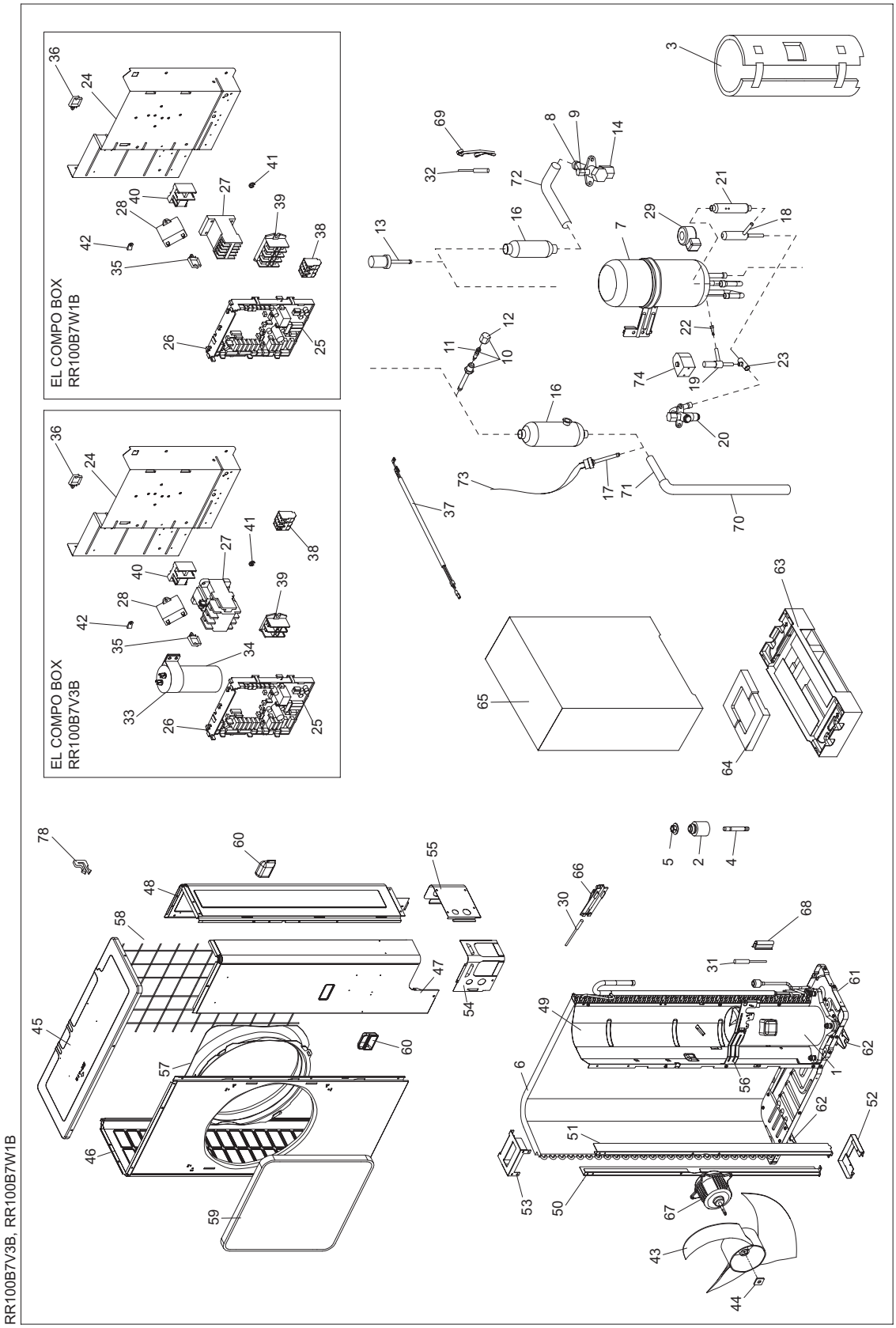
**Components**

The table below contains the components of the exploded view.

| No. | Component | No. | Component |
|---|---|---|---|
| 1 | Compressor | 38 | Terminal strip |
| 2 | Rubber cushion pre-assy | 39 | Terminal strip |
| 3 | Sound insulation (for comp/1) | 40 | Terminal strip for CT |
| 4 | Bolt for compressor | 41 | Cup washer |
| 5 | Nut with washer | 42 | Thermistor clamp |
| 6 | Plate finned coil heat exch as | 43 | Fan propellor |
| 7 | Liquid receiver assy | 44 | Washer |
| 8 | Flare nut 5/8” | 45 | Top plate assy |
| 9 | Stop valve cap | 46 | Front plate assy |
| 10 | Service port | 47 | Front plate (2) assy |
| 11 | Valve core | 48 | Side plate assy |
| 12 | Shraeder round dustcap | 49 | Part. plate assy |
| 13 | Low pressure switch | 50 | Fan motor stand left |
| 14 | Gas stop valve assy | 51 | Fan motor stand right |
| 15 | Filter | 52 | Fan motor stand |
| 16 | Muffler | 53 | Fan motor stand (up) |
| 17 | High pressure switch | 54 | Cover |
| 18 | Motor operated valve body | 55 | Piping cover (rear) |
| 19 | Solenoid valve body | 56 | Stop valve mounting plate |
| 20 | Liquid stop valve assy | 57 | Bell mouth assy |
| 21 | FI233 Filter | 58 | Suction grill |
| 22 | Strainer | 59 | Air discharge grill |
| 23 | T-joint | 60 | Handle |
| 24 | El. compo.mounting assy | 61 | Bottom frame assy |
| 25 | PCB Assy | 62 | Installation leg painted |
| 26 | Resin cover assy | 63 | Bottom tray assy |
| 27 | Magnetic switch | 64 | Cushion top |
| 28 | Fan motor capacitor | 65 | Packing case p/m |
| 29 | Motor operated valve coil | 66 | Thermistor fixing plate |
| 30 | Thermistor | 67 | Single phase AC fan motor |
| 31 | Thermistor | 68 | Thermistor mounting spring |
| 32 | Thermistor | 69 | Thermistor mounting spring |
| 33 | Capacitor fixing band | 70 | Insulation tube |
| 34 | Comp. motor capacitor | 71 | HPS cable |
| 35 | Wire clip | 72 | Solenoid valve coil |
| 36 | Wire clip | 73 | Thermal insulation tube |
| 37 | Crank case heater | | |

## 1.3 RR100B7V3B, RR100B7W1B

**Exploded view** The illustration below shows the exploded view.



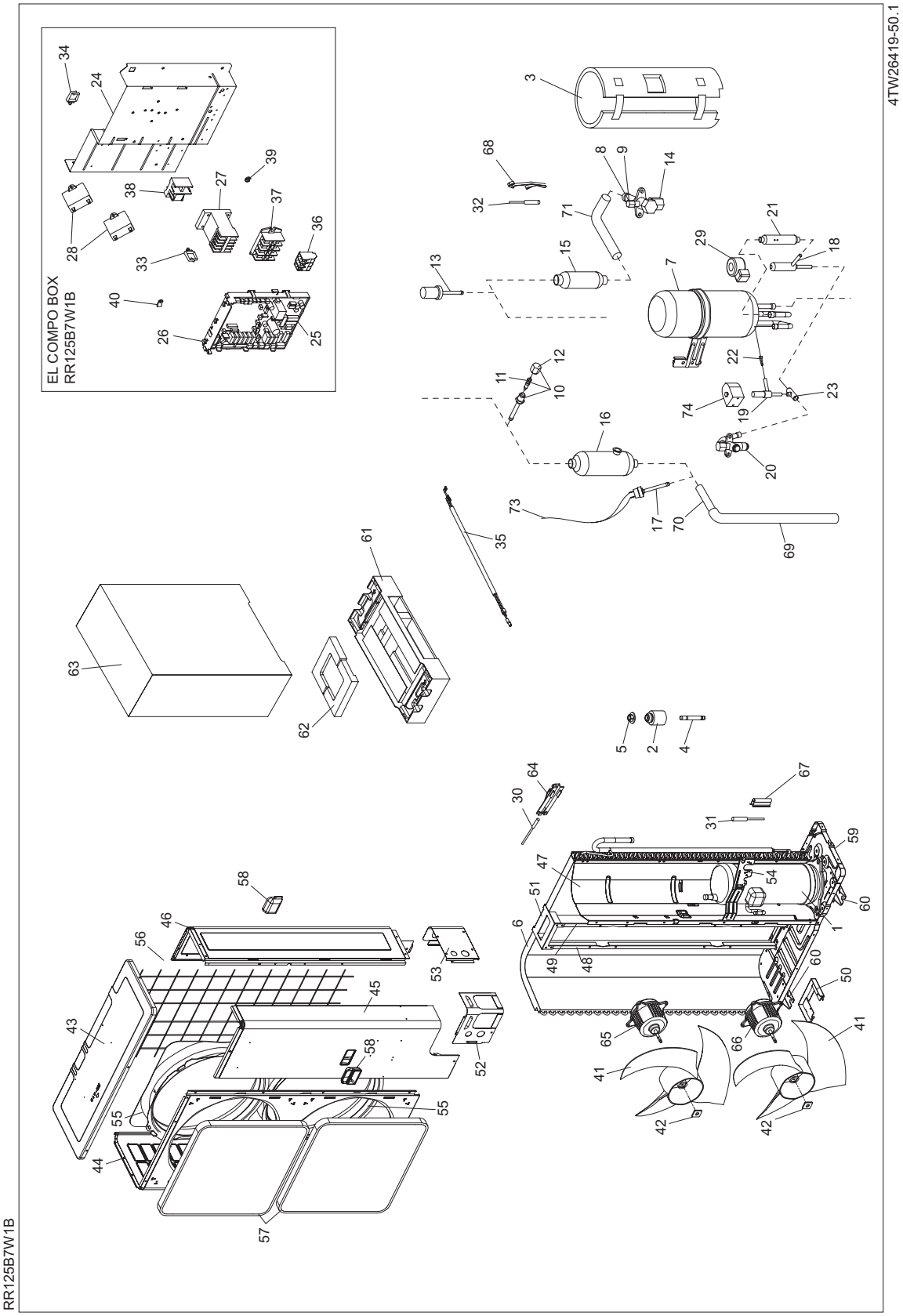
**Components**

The table below contains the components of the exploded view.

| No. | Component | No. | Component |
|---|---|---|---|
| 1 | Compressor | 38 | Terminal strip |
| 2 | Rubber cushion pre-assy | 39 | Terminal strip |
| 3 | Sound insulation (for comp/1) | 40 | Terminal strip for CT |
| 4 | Bolt for compressor | 41 | Cup washer |
| 5 | Nut with washer | 42 | Thermistor clamp |
| 6 | Plate finned coil heat exch as | 43 | Fan propellor |
| 7 | Liquid receiver assy | 44 | Washer |
| 8 | Flare nut 5/8” | 45 | Top plate assy |
| 9 | Stop valve cap | 46 | Front plate assy |
| 10 | Service port | 47 | Front plate (2) assy |
| 11 | Valve core | 48 | Side plate assy |
| 12 | Shraeder round dustcap | 49 | Part. plate assy |
| 13 | Low pressure switch | 50 | Fan motor stand left |
| 14 | Gas stop valve assy | 51 | Fan motor stand right |
| 15 | Filter | 52 | Fan motor stand |
| 16 | Muffler | 53 | Fan motor stand (up) |
| 17 | High pressure switch | 54 | Cover |
| 18 | Motor operated valve body | 55 | Piping cover (rear) |
| 19 | Solenoid valve body | 56 | Stop valve mounting plate |
| 20 | Liquid stop valve assy | 57 | Bell mouth assy |
| 21 | FI233 Filter | 58 | Suction grill |
| 22 | Strainer | 59 | Air discharge grill |
| 23 | T-joint | 60 | Handle |
| 24 | El. compo. mounting assy | 61 | Bottom frame assy |
| 25 | PCB assy | 62 | Installation leg painted |
| 26 | Resin cover assy | 63 | Bottom tray assy |
| 27 | Magnetic switch | 64 | Cushion top |
| 28 | Fan motor capacitor | 65 | Packing case P/M |
| 29 | Motor operated valve coil | 66 | Thermistor fixing plate |
| 30 | Thermistor | 67 | Single phase AC fan motor |
| 31 | Thermistor | 68 | Thermistor mounting spring |
| 32 | Thermistor | 69 | Thermistor mounting spring |
| 33 | Capacitor fixing band | 70 | Insulation tube (gas) |
| 34 | Comp. motor capacitor | 71 | Thermal insulation tube |
| 35 | Wire clip | 72 | Thermal insulation tube |
| 36 | Wire clip | 73 | HPS cable |
| 37 | Crank case heater | 74 | Solenoid valve coil |

## 1.4 RR125B7W1B

**Exploded view** The illustration below shows the exploded view.



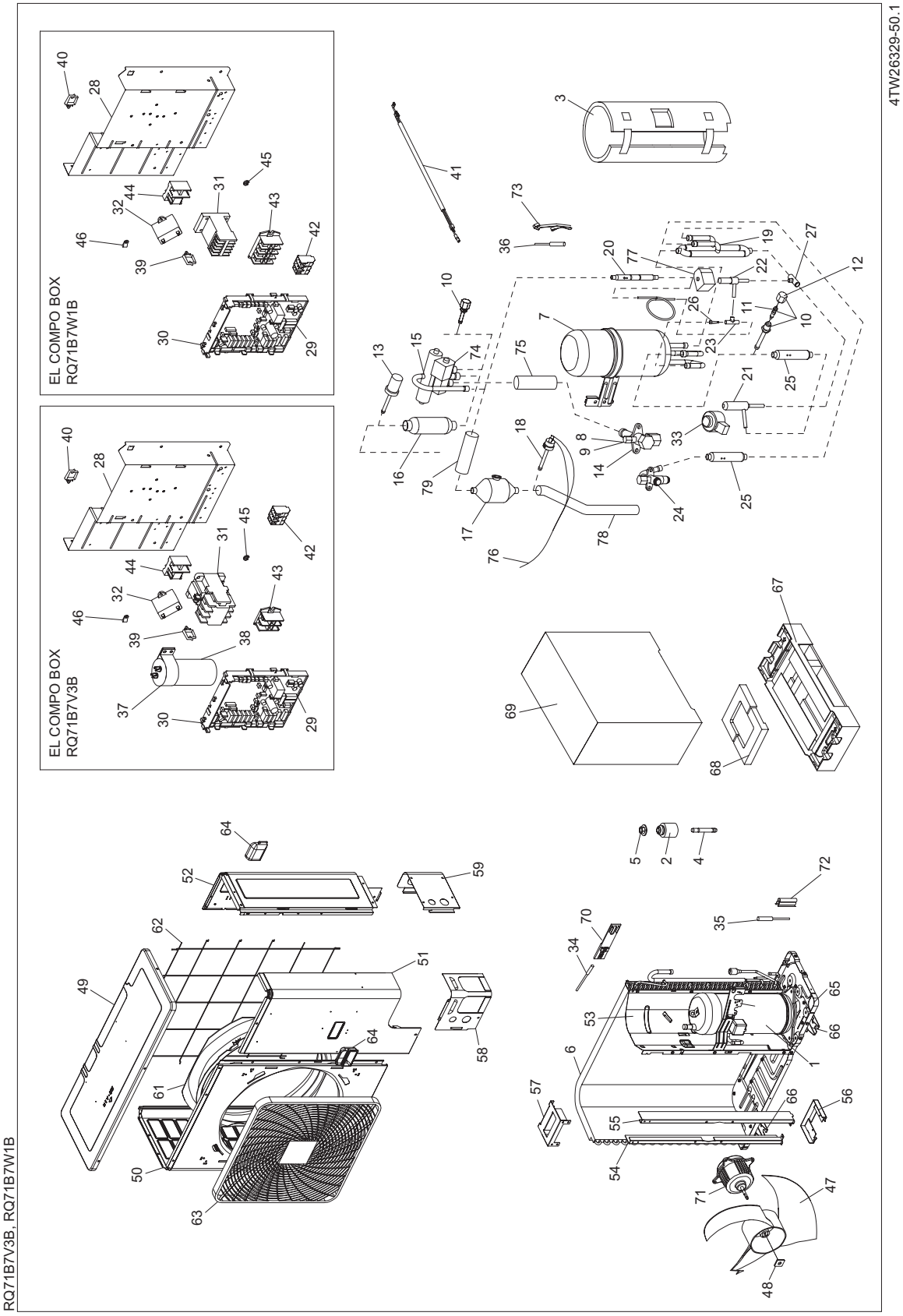
**Components**

The table below contains the components of the exploded view.

| No. | Component | No. | Component |
|---|---|---|---|
| 1 | Compressor | 38 | Terminal strip for CT |
| 2 | Rubber cushion pre-assy | 39 | Cup washer |
| 3 | Sound insulation (for comp/1) | 40 | Thermistor clamp |
| 4 | Bolt for compressor | 41 | Fan propellor |
| 5 | Nut with washer | 42 | Washer |
| 6 | Plate finned coil heat exch as | 43 | Top plate assy |
| 7 | Liquid receiver assy | 44 | Front plate assy |
| 8 | Flare nut 5/8” | 45 | Front plate (2) assy |
| 9 | Stop valve cap | 46 | Side plate assy |
| 10 | Service port | 47 | Part. plate assy |
| 11 | Valve core | 48 | Fan motor stand left |
| 12 | Shraeder round dustcap | 49 | Fan motor stand right |
| 13 | Low pressure switch | 50 | Fan motor stand |
| 14 | Gas stop valve assy | 51 | Fan motor stand (up) |
| 15 | Filter | 52 | Cover |
| 16 | Muffler | 53 | Piping cover (rear) |
| 17 | High pressure switch | 54 | Stop valve mounting plate |
| 18 | Motor operated valve body | 55 | Bell mouth assy |
| 19 | Solenoid valve body | 56 | Suction grill |
| 20 | Liquid stop valve assy | 57 | Air discharge grill |
| 21 | FI233 Filter | 58 | Handle |
| 22 | Strainer | 59 | Bottom frame assy |
| 23 | T-joint | 60 | Installation leg painted |
| 24 | El. compo. mounting assy | 61 | Bottom tray assy |
| 25 | PCB assy | 62 | Cushion top |
| 26 | Resin cover assy | 63 | Packing case p/m |
| 27 | Magnetic switch | 64 | Thermistor fixing plate |
| 28 | Fan motor capacitor | 65 | Single phase AC fan motor |
| 29 | Motor operated valve coil | 66 | Single phase AC fan motor |
| 30 | Thermistor | 67 | Thermistor mounting spring |
| 31 | Thermistor | 68 | Thermistor mounting spring |
| 32 | Thermistor | 69 | Insulation tube (gas) |
| 33 | Wire clip | 70 | Thermal insulation tube |
| 34 | Wire clip | 71 | Thermal insulation tube |
| 35 | Crank case heater | 72 | HPS cable |
| 36 | Terminal strip | 73 | Solenoid valve coil |
| 37 | Terminal strip | | |

## 1.5 RQ71B7V3B, RQ71B7W1B

**Exploded view** The illustration below shows the exploded view.



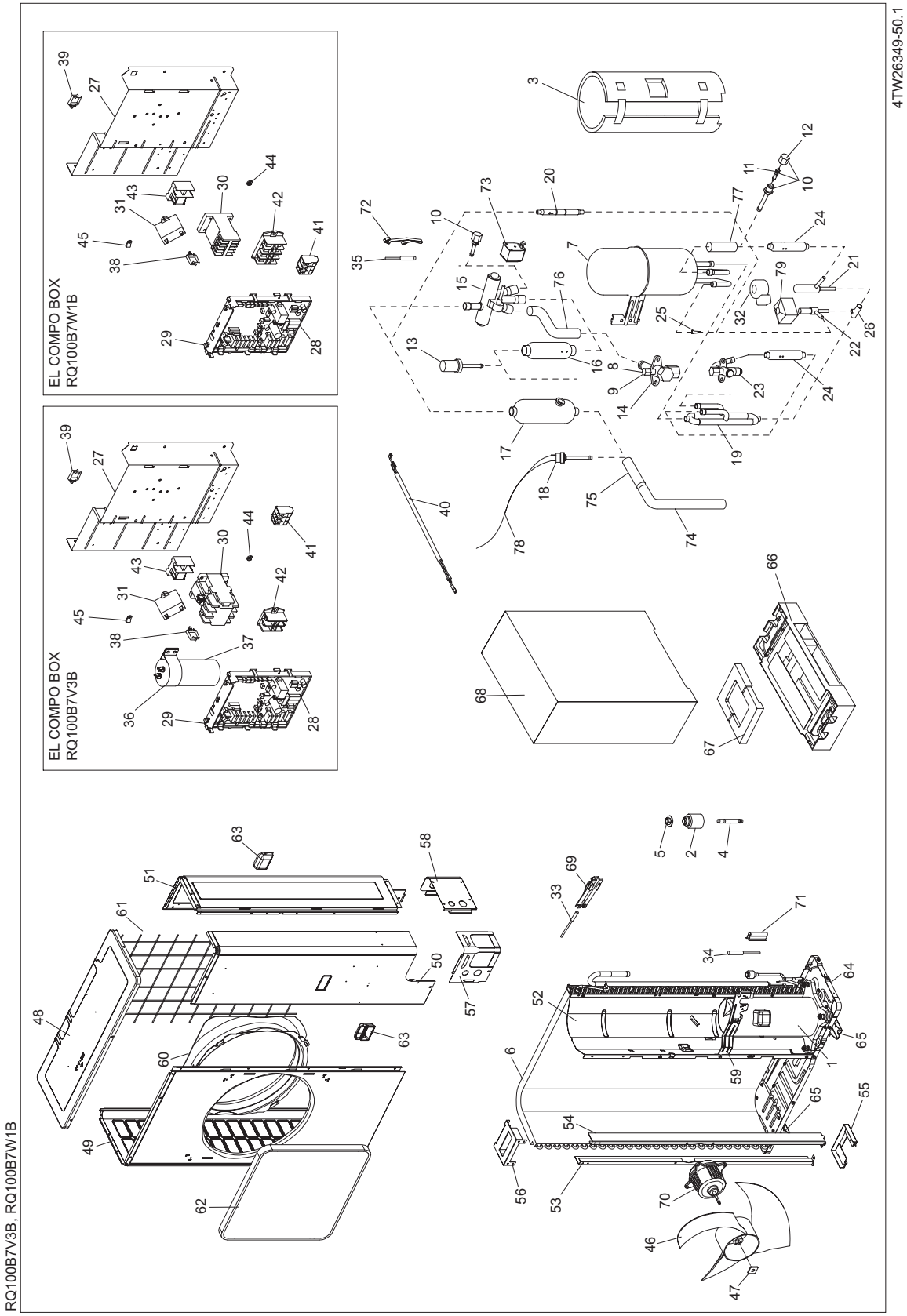
**Components**

The table below contains the components of the exploded view.

| No. | Component | No. | Component |
|---|---|---|---|
| 1 | Compressor | 41 | Crank case heater |
| 2 | Rubber cushion pre-assy | 42 | Terminal strip |
| 3 | Sound insulation (for comp/1) | 43 | Terminal strip |
| 4 | Bolt for compressor | 44 | Terminal strip for CT |
| 5 | Nut with washer | 45 | Cup washer |
| 6 | Plate finned coil heat exch as | 46 | Thermistor clamp |
| 7 | Liquid receiver assy | 47 | Fan propellor |
| 8 | Flare nut 5/8” | 48 | Washer |
| 9 | Stop valve cap | 49 | Top plate assy |
| 10 | Service port | 50 | Front plate assy |
| 11 | Valve core | 51 | Front plate (2) assy |
| 12 | Shraeder round dustcap | 52 | Side plate assy |
| 13 | Low pressure switch | 53 | Part. plate assy |
| 14 | Gas stop valve assy | 54 | Fan motor stand left |
| 15 | Four way valve body | 55 | Fan motor stand right |
| 16 | Filter | 56 | Fan motor stand |
| 17 | Muffler | 57 | Fan motor stand (up) |
| 18 | High pressure switch | 58 | Cover |
| 19 | Check valve assy | 59 | Piping cover (rear) |
| 20 | Check valve | 60 | Stop valve mounting plate |
| 21 | Motor operated valve body | 61 | Bell mouth assy |
| 22 | Solenoid valve body | 62 | Suction grill |
| 23 | T-joint TSS2-2-2 | 63 | Air discharge grill |
| 24 | Liquid stop valve assy | 64 | Handle |
| 25 | FI233 Filter | 65 | Bottom frame assy |
| 26 | Strainer | 66 | Installation leg painted |
| 27 | T-joint | 67 | Bottom tray assy |
| 28 | El. compo. mounting assy | 68 | Cushion top |
| 29 | PCB Assy | 69 | Packing case p/m |
| 30 | Resin cover assy | 70 | Thermistor fixing plate |
| 31 | Magnetic switch | 71 | Single phase AC fan motor |
| 32 | Fan motor capacitor | 72 | Thermistor mounting spring |
| 33 | Motor operated valve coil | 73 | Thermistor mounting spring |
| 34 | Thermistor | 74 | Coil of 4-way valve |
| 35 | Thermistor | 75 | Insulation tube (gas) |
| 36 | Thermistor | 76 | HPS cable |
| 37 | Capacitor fixing band | 77 | Solenoid valve coil |
| 38 | Comp. motor capacitor | 78 | Thermal insulation tube |
| 39 | Wire clip | 79 | Thermal insulation tube |
| 40 | Wire clip | | |

## 1.6 RQ100B7V3B, RQ100B7W1B

**Exploded view** The illustration below shows the exploded view.



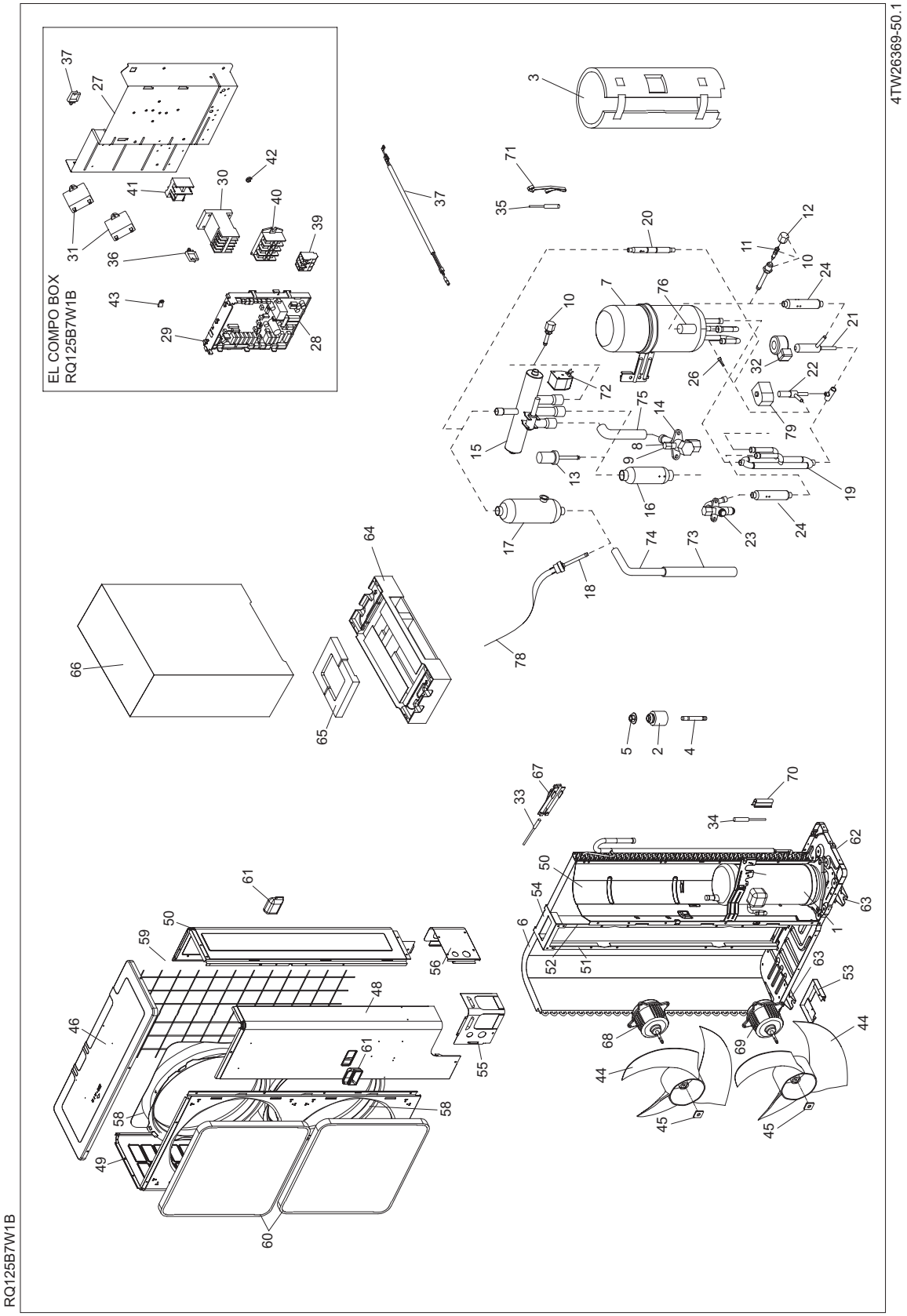
**Components**

The table below contains the components of the exploded view.

| No. | Component | No. | Component |
|---|---|---|---|
| 1 | Compressor | 41 | Terminal strip |
| 2 | Rubber cushion pre-assy | 42 | Terminal strip |
| 3 | Sound insulation (for comp/1) | 43 | Terminal strip for CT |
| 4 | Bolt for compressor | 44 | Cup washer |
| 5 | Nut with washer | 45 | Thermistor clamp |
| 6 | Plate finned coil heat exch as | 46 | Fan propellor |
| 7 | Liquid receiver assy | 47 | Washer |
| 8 | Flare nut 5/8” | 48 | Top plate assy |
| 9 | Stop valve cap | 49 | Front plate assy |
| 10 | Service port | 50 | Front plate (2) assy |
| 11 | Valve core | 51 | Side plate assy |
| 12 | Shraeder round dustcap | 52 | Part. plate assy |
| 13 | Low pressure switch | 53 | Fan motor stand left |
| 14 | Gas stop valve assy | 54 | Fan motor stand right |
| 15 | 4-way valve body | 55 | Fan motor stand |
| 16 | Filter | 56 | Fan motor stand (up) |
| 17 | Muffler | 57 | Cover |
| 18 | High pressure switch | 58 | Piping cover (rear) |
| 19 | Check valve assy | 59 | Stop valve mounting plate |
| 20 | Check valve | 60 | Bell mouth assy |
| 21 | Motor operated valve body | 61 | Suction grill |
| 22 | Solenoid valve body | 62 | Air discharge grill |
| 23 | Liquid stop valve assy | 63 | Handle |
| 24 | FI233 Filter | 64 | Bottom frame assy |
| 25 | Strainer | 65 | Installation leg painted |
| 26 | T-joint | 66 | Bottom tray assy |
| 27 | El. compo. mounting assy | 67 | Cushion top |
| 28 | PCB assy | 68 | Packing case p/m |
| 29 | Resin cover assy | 69 | Thermistor fixing plate |
| 30 | Magnetic switch | 70 | Single phase AC fan motor |
| 31 | Fan motor capacitor | 71 | Thermistor mounting spring |
| 32 | Motor operated valve coil | 72 | Thermistor mounting spring |
| 33 | Thermistor | 73 | Coil of 4-way valve |
| 34 | Thermistor | 74 | Insulation tube (gas) |
| 35 | Thermistor | 75 | Thermal insulation tube |
| 36 | Capacitor fixing band | 76 | Thermal insulation tube |
| 37 | Comp. motor capacitor | 77 | Thermal insulation tube |
| 38 | Wire clip | 78 | HPS cable |
| 39 | Wire clip | 79 | Solenoid valve coil |
| 40 | Crank case heater | | |

## 1.7 RQ125B7W1B

**Exploded view** The illustration below shows the exploded view.



**Components**

The table below contains the components of the exploded view.

| No. | Component | No. | Component |
|---|---|---|---|
| 1 | Compressor | 40 | Terminal strip |
| 2 | Rubber cushion pre-assy | 41 | Terminal strip for CT |
| 3 | Sound insulation (for comp/1) | 42 | Cup washer |
| 4 | Bolt for compressor | 43 | Thermistor clamp |
| 5 | Nut with washer | 44 | Fan propellor |
| 6 | Plate finned coil heat exch as | 45 | Washer |
| 7 | Liquid receiver assy | 46 | Top plate assy |
| 8 | Flare nut 5/8” | 47 | Front plate assy |
| 9 | Stop valve cap | 48 | Front plate (2) assy |
| 10 | Service port | 49 | Side plate assy |
| 11 | Valve core | 50 | Part. plate assy |
| 12 | Shraeder round dustcap | 51 | Fan motor stand left |
| 13 | Low pressure switch | 52 | Fan motor stand right |
| 14 | Gas stop valve assy | 53 | Fan motor stand |
| 15 | 4-way valve body | 54 | Fan motor stand (up) |
| 16 | Filter | 55 | Cover |
| 17 | Muffler | 56 | Piping cover (rear) |
| 18 | High pressure switch | 57 | Stop valve mounting plate |
| 19 | Check valve assy | 58 | Bell mouth assy |
| 20 | Check valve | 59 | Suction grill |
| 21 | Motor operated valve body | 60 | Air discharge grill |
| 22 | Solenoid valve body | 61 | Handle |
| 23 | Liquid stop valve assy | 62 | Bottom frame assy |
| 24 | FI233 Filter | 63 | Installation leg painted |
| 25 | Strainer | 64 | Bottom tray assy |
| 26 | T-joint | 65 | Cushion top |
| 27 | El. compo. mounting assy | 66 | Packing case p/m |
| 28 | PCB assy | 67 | Thermistor fixing plate |
| 29 | Resin cover assy | 68 | Single phase AC fan motor |
| 30 | Magnetic switch | 69 | Single phase AC fan motor |
| 31 | Fan motor capacitor | 70 | Thermistor mounting spring |
| 32 | Motor operated valve coil | 71 | Thermistor mounting spring |
| 33 | Thermistor | 72 | Coil of 4-way valve |
| 34 | Thermistor | 73 | Insulation tube (gas) |
| 35 | Thermistor | 74 | Thermal insulation tube |
| 36 | Wire clip | 75 | Thermal insulation tube |
| 37 | Wire clip | 76 | Thermal insulation tube |
| 38 | Crank case heater | 77 | HPS cable |
| 39 | Terminal strip | 78 | Solenoid valve coil |

# Index

## Numerics



## A



## B



## C



## D

# E



# F



# G



# H

# I



# J



# L



# M



# N



# O



# P

# R



# S



# T

# U



# V



# W